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ALASKA DEPARTMENT OF FISH AND GAME BIOLOGICAL SUMMARY OF THE 1992 MANDATORY SHELLFISH OBSERVER PROGRAM DATABASE

By

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ability to endure the inimical conditions of working and living at sea for extended periods has produced the raw data summarized in this report.

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INTRODUCTION

During the spring of 1988, the Alaska Board of Fisheries (B.O.F.) mandated at sea observer coverage for all vessels commercially processing king and Tanner *C. bairdi* crab in Alaskan waters. Since that time, the B.O.F. has amended the directive for at sea observer deployment to include the Bering Sea *C. opilio* fisheries. Additionally, board members also granted authority to the Alaska Department of Fish and Game (ADF&G) to place observers on commercial vessels participating in other Alaskan shellfisheries, when such action would facilitate the only means to collect valuable biological and fishery management data.

Historically, the primary purpose and justification of the shellfish observer program has been to provide an enforcement monitoring tool to promote the long term health of the fisheries. Although shellfish observers employ a substantial amount of effort monitoring and documenting the fishing activities of commercial vessels, they also collect a wealth of biological data. These data are useful for establishing patterns in population dynamics with regard to stock age composition, reproductive patterns and the effects of commercial exploitation. Ultimately, the shellfish observer biological database provides a valuable source of information to facilitate more comprehensive management of Alaska's shellfish resources.

Since the inception of the program in 1988, a database of biological and regulations compliance information collected by observers has been maintained by Westward Region ADF&G staff members. Archived information includes a variety of commercial fishing and shellfish biology statistics, ranging from pot locations, gear types and soak periods, to species composition of catches, biological and legal crab size frequencies, and the reproductive status of female crabs.

During the 1992 Bering Sea/Aleutian shellfisheries, observers were deployed on both catcher processor and floating processor vessels. Observers deployed on floating processors have access only to pre-sorted and retained catches, which limits certain types of data collection, while observers placed on catcher processors are able to examine pot contents prior to any catch sorting.

For this report, compiled data has been derived from observer deployments during fisheries occurring in the 1992 calendar year. Due to the substantial volume of archived information, the scope of data presented has been narrowed to include only size frequency and molt stages of commercially retained crabs, the documented occurrences of illegally retained crabs, and the results of random pot sampling. Topical statistics from the 1990 and 1991 seasons has also been incorporated for comparative purposes. Any inconsistencies between findings presented in this document and previously published reports regarding the shellfish observer databases are the result of updated summaries and current interpretation of historical data.

Abridged observer database statistics, presented in the section discussing the Bristol Bay red king crab fishery, have been taken directly from the previously published report entitled Mandatory Shellfish Observer Program Report to the Alaska Board of Fisheries: Biological Summary of the 1992 Bristol Bay Red King Crab Fishery (Tracy 1993). Other pertinent data are size frequency measurements of retained crabs collected at shoreside processing locations by ADF&G "dockside" samplers.

Additional information, regarding Bering Sea/Aleutian Islands fishery management and the shellfish observer program, is provided by Griffin and Ward (1993), and Morrison et.al (1993).

METHODS

Comprehensive shellfish observer sampling methodologies are outlined in the most recent publishing of the *ADF&G Shellfish Observer Field Manual* (ADF&G 1993).

For the purposes of this report, terms related to the discussion of sampled crabs are as follows:

Carapace Length (CL) - the straight line distance across the carapace from the posterior margin of the right eye orbit to the medial-posterior margin of the carapace; the biological size measurement of Korean hair crabs and all king crab species.

Carapace width (CW) - the straight line distance across the carapace at a right angle to a line midway between the eyes to the medial-posterior margin of the carapace not including the spines; the biological size measurement of *C. bairdi* and *C. opilio* crabs.

Legal Size - the straight line distance across the carapace of male crabs at a right angle to a line midway between the eyes to the medial-posterior margin of the carapace including the spines.

Mature - crabs (both male and female) that have attained a biological size at which 50 percent or more of the total are capable of mating.

Immature - crabs (both male and female) that have not attained a biological size at which 50 percent or more of the total are capable of mating.

New-Shell - crabs that molted during the last molting season.

Old-Shell - crabs that failed to molt during the last molting season or female *C. bairdi* and *C. opilio* that have completed a pubescent molt.

Eyed Eggs - embryoed eggs.

Uneyed Eggs - non-embryoed eggs.

Floating Processors

Shellfish observers on floating processors monitor the majority of catcher vessel deliveries for commercial shellfish regulations compliance with regard to legal species, sex, legal size of harvested crabs. Observers placed on the floating processors also collect species composition data

from the retained catch. Sampling consists of examining at least 100 randomly selected crabs from each catcher vessel's harvest to determine carapace size distributions and shell age (molting) conditions. Standards for assessing carapace size is defined by ADF&G, and vary depending on the species being inspected. These measurements are referred to as "Length or Width Frequencies" and will be discussed in subsequent sections addressing each fishery.

Observers onboard floating processors also survey 600 crab taken from individual catcher vessel deliveries to ascertain a percentage, if any, of illegally retained animals. This sample type is referred to as the "Legal Tally".

Catcher Processors

Shellfish observers deployed on catcher processor vessels have the opportunity to conduct a more comprehensive survey of vessel fishing activities and catch statistics than those on board floating processors. In addition to collecting the Length/Width Frequency and Legal Tally samples, the observer routinely examines randomly selected pots for species composition. This procedure referred to as the "bycatch" sample. Bycatch sampling entails enumerating all species in a pot, assessing the size frequencies of all commercially important crabs observed, recording the status of these crabs with regard to whether they have attained legal retention size, determining their shell age composition, and evaluating the reproductive condition of any captured female crabs.

Daily sampling objectives for shellfish observers (in terms of the quantity of fished pots examined, crabs measured, etc.) is dependent on a number of variables. In particular, factors such as whether an individual has been assigned any special data collection projects, the projected duration of the fishery in which the observer is deployed, and the data collection priorities established by ADF&G staff for each fishery. Sampling goals for a given fishery will be discussed in subsequent sections of this report when appropriate.

RESULTS AND DISCUSSION

Bering Sea C. opilio

During the 1992 season, 116 shellfish observers deployed on catcher processor and floating processor vessels measured in excess of .3 million *C.opilio* during the four month fishery (Griffin 1993). The overall carapace width (CW) derived from retained crab revealed an average size of 112.2 millimeters; significantly larger than the 109 millimeter average size of retained crab examined by observers in 1990 (Figure 1). In 1992, a difference of nearly 4 mm CW between the mean size of a retained male *C. opilio* observed on catcher processors and the averages of crabs measured at shoreside processors was also evident (Table 1). A more comprehensive representation of the carapace width distributions of all retained male *C. opilio* measured during the season is given in Table 2.

Pot sample or "Bycatch" *C.opilio* male and female CW frequencies and shell age assessments collected during the 1990, 1991, and 1992 fisheries are depicted in Figures 2 and Figure 3,

respectively. During the 1992 season, observers attempted to sample a minimum of one pot per vessel fishing day. The male CW frequencies represent all crabs observed in the sampled pots, rather than only those retained by the vessel crew for processing. Since a total of only 9 pots were sampled and 495 male crabs measured during the 1990 fishery, comparisons to data generated in subsequent seasons are not tenable. The results of sampling conducted during the 1991 and 1992 fisheries indicate a slight upward shift in the overall sizes of crabs observed in pot samples, as evidenced by the increase in mean size between the two years.

C. opilio females were absent in pot samples collected during the 1990 season. The incidence of terminally molted females observed in the 1992 fishery increased dramatically over those examined in 1991. This occurrence might possibly indicate an increased level of immature female mortality in the population over the last two years.

Illegal commercial retention of undersized, out of season and female crabs during the Bering Sea *C. opilio* fisheries has been previously attributed to the incidence of undersized male *C. bairdi* in the catches. Illegal crab statistics by processor type represent the incidence of undersized *C. opilio* males and illegal females observed in the 1992 fishery (Table 3). The legal retention size of a male *C. opilio* is defined in State of Alaska commercial shellfish regulations as a 3.1 inch total CW. Of the nearly 1.5 million crabs examined by shellfish observers throughout the season, the occurrence of illegal males and females was well below one-tenth of one percent. The percentage of illegal *C. opilio* observed on catcher processors as opposed to floating processors appears negligible (Table 3).

The incidence of illegal *C. bairdi* recorded in *C. opilio* catches during 1992 is shown in Table 4. Traditionally, concerns over excessive levels of undersize *C. bairdi* documented in *C. opilio* catches were the primary enforcement focus of shellfish observers deployed in the fishery. In the 1992 season, percentages of unlawfully retained *C. bairdi* males remained consistent at four-tenths of one percent at both catcher processor and floater processing locations. Overall, slightly greater than 1.3 percent of the *C. opilio* harvest was monitored for vessel compliance with legal size regulations.

Of particular interest are catch per pot statistics of both directed fishery species and the composition of other incidentally caught animals. The results of pot sample data collected in the 1992 *C. opilio* fishery are given in Table 5. Catches of legal-sized (though not necessarily retained) male *C. opilio* averaged nearly 209 per pot, although the typical occurrence of illegal males was considerably lower at 1.5 crabs per pot. Male *C. bairdi* appeared to be the only significant incidental catch species with an average of 8.1 crabs per pot.

Comparisons of catches per pot in the *C. opilio* fishery over the past three seasons are summarized without consideration of variables such as catch date, pot soak time or fishing location (Figure 4). Pot sample results from the 1990 fishery may not reflect general catch rates due to the limited quantity of pots examined during the season, and the fact that one catcher processor was monitored. Comparison of pot sampling conducted during the 1991 and 1992 fisheries indicates an approximate 20 percent decline in the mean catch per pot of legal *C. opilio*. Catches of legal non-retained *C. opilio* declined between the two seasons, from an average of

13.4 crabs per pot in 1991, to just under a 4 crab per pot during the 1992 fishery. Average catches of incidental species was relatively consistent throughout both seasons (Figure 4).

The assessed shell ages of *C. opilio* males and females was essentially the same over the three consecutive fisheries (Table 6). While the annual percentages of males classified as one-to-two year skip molt ("new-shell" or "old-shell") shells remained consistent, the concurrent decline in 1991 and increase in 1992 of female new shell and old shell crabs could indicate a decrease in recruitment of mature females into the population.

Evaluation of the reproductive status of female *C. opilio* observed in pot samples indicates a large difference between 1991 and 1992. As illustrated in Figure 5 and Table 7, the number of females bearing uneyed eggs dropped sharply in 1992, from 72.4 percent examined in 1991, to 11.6 percent in 1992. Conversely, the number of females bearing eyed eggs increased nearly 800 percent between the two seasons. Again, this apparent disparity may signify a decrease in mature female recruitment into the population. The overall 85 percent decline in numbers of female *C. opilio* observed in bycatch samples between the two seasons may also be indicative of poor recruitment (Figure 3).

Bering Sea Brown King Crab

In recent years, Bering Sea brown king crab stocks have not been affected by commercial exploitation. A directed effort in this fishery was conducted by two catcher processors and a small number of catcher vessels during the months of May and June, 1992 (Griffin 1993). Summarized information from this fishery is from single
onboard observer and constitutes the principal biological information available from this modest fishery.

A small sample of 153 retained brown king males indicates an average carapace length (CL) of 141.9 millimeters (Table 8, Figure 6). Accordingly, most of the retained crab were in the 141 - 145 millimeter range (Table 9). The overall carapace length distribution of brown king males examined in pot samples is shown in Figure 7. The lack of an adequate sample size, and absence of an available historic length frequency database from the Bering Sea population precludes any assessment of stock dynamics. However, crabs were represented by a broad range of age classes was evident in the of 384 males examined.

The length frequency distribution of female brown king crabs identified in the Bering Sea fishery was also derived from a relatively small sample size of 226 individuals (Figure 8). The average CL of 95 mm is nearly equivalent to that found in the males, and illustrates a striking contrast to the mean shell size of female brown king crabs observed in other fisheries subsequently discussed in this report.

A total of 15 pots were sampled for species composition the 1992 season. Captured animals incidental to the targeted brown king crabs consisted of other deep ocean dwelling crab species, of which the most prevalent was *Chionocetes tanneri.* Legal sized brown king males, defined in the state shellfish regulations as only those crab with a CW of 5.5 inches or greater, averaged 2 crabs per pot. Catches of undersized male brown kings outnumbered the legal males at a ratio

of greater than five to one and, typically, 4 female brown king crabs were released for every male that was retained.

Estimated aggregate catches of selected species in pot samples collected during the 1992 season are provided in Table 10. The basis for these approximations consists of multiplication of observer sample pot catches by the number of overall pot pulls reported to ADF&G (by all participating vessels) during the fishery. Extrapolated results indicate that possibly more than 8,600 sub-legal male brown king crabs and nearly 6,000 females were captured and released in the 1992 season.

Shell age distributions of both male and female brown king crabs observed in pot samples were assessed from sample sizes of 192 and 113 individuals, respectively (Table 11). Of the males examined, 94.3 percent were considered new shell; only one was deemed to have skipped successive molting cycles. Females also displayed predominantly new-shell age frequency of greater than 90 percent, with the balance of the sample exhibiting skip molt shell age characteristics.

Most brown king females examined for reproductive state appeared to be sexually immature; 85 percent of those inspected were described as non-mated (Figure 10). Female king crabs possessing setae with no evidence of matting are defined as displaying no evidence of cyclic mating activity. Of the 13 females possessing egg clutches, 12 contained uneyed eggs (Table 12).

St. Matthew Island Blue King Crab

In recent years, intense fishing effort in the St. Matthew blue king crab fishery has reduced the duration of the commercial season to just a few days. The 1992 opening commenced on September 4th and concluded 60 hours later (Griffin 1993). Total observer deployments consisted of eight personnel on catcher processors and seven on floating processors (Morrison, et al. 1993).

Samples of retained male blue king crabs were available at all processing locations during the 1992 season. Over 10,000 retained crab measurements were recorded by observers on floating processors, as opposed to 2,120 and 1,897 crabs examined on catcher processors, and shoreside locations, respectively (Table 13). The overall average size of a retained male in 1992 was 133.2 mm CL, essentially the same as the mean CL of harvested crabs during the prior two seasons (Figure 11). The numbers and percentages of retained male length distributions compiled (in 5 mm groupings) from the past three fisheries are shown in Table 14. As illustrated in Figure 12, length frequency distributions of all males inspected in pot samples from catcher processors over the last several years seems to denote the presence of a robust age class approaching harvestable size in the population; probably in the 1995 and 1996 seasons.

Overall abundance and length distribution statistics of female blue kings observed in pot samples are depicted in Figure 13. The average size of a female from the 1990, 1991, and 1992 seasons remained relatively consistent (at 88, 87, and 86 mm respectively), but there appeared to be a slight increase in numbers of juvenile crabs in the 67 - 77 mm.

Retention of undersized blue king males, females and other illegal crabs was limited to less than one percent of the total catch during the 1992 fishery (Table 15). Over 76,000 retained crabs were inspected for legal status, which amounted to 18.1 percent of the reported harvest of .42 million individuals (Griffin 1993). Cumulative percentages of illegal crabs observed on catcher processors and floating processors were nearly equal.

Only 70 pots were examined for species composition during the 1992 St. Matthew fishery, from 56,630 reported pot pulls made during the season (Griffin 1993). As shown in Table 16, analysis of those samples shows a significant increase in the catch per pot of females. Comparisons to the pot catches recorded during the consecutive years of commercial effort reveal a three fold increase in the occurrence of females between 1991 and 1992 (Figure 14). Overall pot catches of shellfish species were dominated by blue king crabs with 37 legal sized *C.opilio* males also reported rom the 1992 season.

From 1990 - 1992, new-shell male blue king crabs dominated catches. The numbers of crabs in this shell age class range between 80 and 90 percent of the total individuals assessed (Table 17).

The incidence of new-shell female blue king crabs between 1990 and 1992 have increased from 51.8 percent in 1990 to 80.3 percent in 1992 (Table 17). Subsequently, the abundance of crabs recorded as skip molts decreased by nearly 60 percent between 1990 and 1992.

As was documented in the shellfish observer data sets complied in 1990 and 1991, the occurrence of gravid female blue king crabs is nearly nonexistent in the St. Matthew fishery (Table 18). Of the 3,061 females examined in 1992, only 10 contained egg clutches, six of which were uneyed. Females barren of egg clutches, but possessing matted setae, constituted 53.6 percent; slightly more than the occurrence of non-mated females (Figure 15).

Dutch Harbor Brown King Crab

Deployment of shellfish observers in the Dutch Harbor brown king crab fishery has historically been limited to a small number of catcher processors. The proximity of fishing grounds to Dutch Harbor shoreside processing locations, combined with the generally modest vessel effort, reduces the need for industry utilization of floating processors. In the 1992 season, 6 observers were placed on catcher processor vessels. Dockside ADF&G samplers were unable to access deliveries of Dutch Harbor brown kings in the 1992 season and consequently, all data presented in this report from that period was generated from samples collected on catcher processors.

The average size of retained brown king males in 1992 was 147.8 mm CL from 14,832 crabs measured (Table 19). Comparative length distributions of retained catches from the 1990 and 1991 fisheries are given in Table 20. The mean CL of harvested males declined approximately 3 percent between 1990 and 1991, from 152.7 to 147.9 millimeters respectively (Figure 16).

Male brown king size frequency distributions from pot samples over the past three seasons indicates an increase in the numbers of juvenile and pre-recruit males, in part evidenced by a considerable drop (6 mm) in the mean size of crabs from 1991 to 1992 (Figure 17). The average

length of females showed remained constant at 116 mm between 1991 and 1992, as illustrated in Figure 18.

Over 70 percent of the 1992 reported catcher processor harvest of 93,617 brown king crabs (Griffin, 1993) was monitored by shellfish observers for compliance with commercial shellfish regulations. As shown in Table 21, 525 undersized crabs and 63 females were recorded in the course of Legal Tally sampling. The overall illegal crab retention percentage of 0.9 percent would seem to indicate that unlawful at-sea processing may be a minor regulations enforcement concern in this fishery.

However, the 1992 Dutch Harbor season was characterized by high bycatch rates of female and undersized male brown king crabs in pot samples. Based on respective average catches of 15.8 and 21.4 sub-legal males and females, estimated cumulative catches of each were .6 million and .8 million (Table 22). These findings are consistent with incidental catch rates of non-retainable brown king crabs in prior years, as is shown in Figure 19. Pot sample catches of legal males have remained relatively unchanged over the last three seasons as well, at 6.5, 5.3 and 6.3 crabs per pot in 1990, 1991 and 1992.

Scant published information is available on the molt schedule of brown king crabs in general, but, the percentages of males and females characterized as new shell, skip molts and second year skip molts, has remained stable in the consecutive annual shellfish observer data sets presented in this report. During each of the three seasons, greater than 90 percent of male and female crabs possessed new shells, with most of the remainder assessed as skip molts (Table 23).

During the 1992 fishery, 3,179 female brown kings were inspected for the presence or absence of egg clutches. Results indicated that predominant numbers of females (1,451) were non-ovigerous, and showed no signs of mating activity within the prior year (Table 24). Nearly 46 percent did possess egg clutches; 617 of these clutches contained eyed eggs. In general, the reproductive state of brown king females has been similar in the 1990, 1991, and 1992 fisheries Figure 20).

Bering Sea Korean Hair Crab

Historic targeted and incidental commercial exploitation of Bering Sea Korean hair crab stocks has taken place almost exclusively in the shoal areas adjacent to the Pribilof Islands. During the early 1980's, vessels in the area annually harvested up to 2.4 million pounds of hair crabs (ADF&G 1983).

In recent years, there has been little fishing interest in the Korean hair crab fishery, primarily due to a depressed population and a limited market. During the autumn of 1992, results of the 1992 NMFS survey elicited commercial effort from a handful of catcher vessels and one catcher processor. Since biological data on these stocks is generally lacking, two ADF&G personnel were deployed on volunteering catcher vessels during the fishery, in addition to the shellfish observer placed onboard the single catcher processor. Most data presented here has been derived from all three of the commercial vessels monitored.

The average size of retained males examined in 1992 showed a dramatic decrease from the mean size of hair crabs traditionally harvested in the fishery. Taken from a sample size of 800 retained individuals, the typical CL of 83.1 mm (Table 25) is markedly smaller than the average size of 103.2 mm CL recorded during the 1982 season (ADF&G 1983). Overall length frequency distributions of harvested male samples are given in Table 26 and Figure 21.

Length measurements collected from all hair crab males (observed in pot content samples) revealed a potentially narrow range of age classes present in the stocks (Figure 22). However, crabs less than 62 mm CL, largely absent from pot catches, were documented in trawl tows made around the Pribilof Islands during the 1992 survey conducted by the National Marine Fisheries Service. Overall, the mean length of all males observed in the pot samples was nearly identical to that of the harvested crabs.

Few female Korean hair crabs were found in pot samples during the 1992 season. Of the 21 crabs examined, sizes ranged from 42 to 82 mm CL (Figure 23). The average size of 62 mm CL, is higher than the assumed maturity index of 50 mm for the species (Abe 1977; Armetta and Stevens 1987).

At the time of the 1992 fishery, there was no established size limit for commercial harvest of hair crab males in the Bering Sea. Consequently, harvest monitoring by the single shellfish observer deployed during the season was confined to documenting retention of female hair crabs and other incidental species. Results of that sampling is not discussed in this report.

Incidental shellfish species recorded in pot (bycatch) samples collected in the 1992 season included red and blue king crabs, as well as a number of *C. bairdi* and *C. opilio* (Figure 24). Catches of hair crab males averaged 16.6 per pot; 8.9 crabs per pot were retained for sale. Cumulative estimated catches of selected species based on pot sample catches and total reported pot pulls are given in Table 27.

Shell age assessments of hair crabs proved difficult for both ADF&G personnel and the shellfish observer deployed in the fishery. Normal symptoms of shell aging commonly found in other crab species (such as evidence of scratching, dactyl bluntness and carapace discoloration) were absent on all hair crab specimens examined. Molt stage determinations were based on the presence of barnacle and algae growth on each specimen, albeit that this criterion is somewhat subjective. As shown in Table 28, 92.6 percent of the 1,815 males were classified as new shells; the remainder were largely characterized as one year skip molts. The 21 females inspected were nearly divided evenly into new and old shell age categories.

Few females were found in pot samples that displayed signs of annual mating activity at the time of the fishery. Of 19 females examined 79 percent were devoid of egg clutches (Figure 25). Four females were ovigerous, but only 1 possessed eyed eggs (Table 29).

Bristol Bay Red King Crab

Historically, the Bristol Bay area fishery has produced some of the largest commercial catches of red king crab on record. In recent years, depressed stocks and intense fishing effort have

reduced the duration of the red king season to an average of 6 to 7 days in early November (Griffin 1992,1993). As a result, there is a limited window of opportunity is available for the collection of harvest and biological data by shellfish observers. In 1992, 17 observers were onboard catcher processors and 6 were placed on floating processors (Morrison et al. 1993). As is the case in other short duration Bering Sea shellfisheries, daily sampling goals for observers deployed in the red king season were higher than normal.

A total of 23,408 retained male red king crabs were measured for size distribution in the 1992 season. Observers onboard floating processors sampled 86 catcher deliveries which accounted for 77 percent of the total deliveries reported (Griffin 1993). The average length of a retained male in 1992 was 152.8mm (Table 30). The dominant numbers of crab in a given 5mm grouping occurred between 150 - 155mm compared to peak percentages observed in the 145 - 150mm size class during 1990 and 1991 respectively (Table 31). Overall, a slight increase in the size of the retained commercial catch was evident, as illustrated by Figure 26.

The incidence of illegal crab was negligible with 383 undersized males tallied out of a sample size of 72,816 crabs. A comparison of length distributions from both processing types monitored by observers is shown in Table 32. Sixteen females were observed in catcher processor samples compared to 12 on floater processors and a 41 Tanner and Snow crab were recorded accounting for less than 0.05 percent of the sample. The cumulative percentage (0.62) of illegal crabs retained extrapolates to an estimated 3,511 animals out of the 558,212 crabs harvested by catcher processors and catcher vessels delivering to floating processors (Griffin 1993).
Of the 205,940 reported pot pulls in the 1992 red king crab fishery (Griffin 1993), a total of 289 were examined for contents. From these randomly selected pot samples, the average fishing depth was calculated to be 35 fms and the average soak time was one day. Samples were taken from the same general area as 1991, reflecting little change in the locale of directed fishing effort.

Summary of pot samples revealed an average catch 5.2 legal sized red king crab, which displayed a more than 50 percent reduction from the average catch of 11.4 legal males observed in the 1991 fishery (Figure 29). The incidence female and undersize male red king crab showed increases in numbers per pot over the previous two consecutive years. The catch per pot of females in 1992 was 11.7 compared to averages of 2.1 and 10.1 in 1991 and 1990, respectively. Sub-legal males averaged 11.2 per pot during the 1992 season, nearly 80 percent more crabs per pot than was reported in 1990 and 1991. Catches of pacific cod were generally the same in the three previous seasons at well below one fish per pot. Average catch per pot of other commercially important species are given in Table 33.

Results from pot samples taken in the 1992 season were used to project cumulative catches for each species observed (Table 33). Estimates were made by multiplying mean pot catches by the total pot pulls reported for the fishery. A comparison of the reported harvest of 1.2 million legal red king crab (Griffin 1993), and the pot sample estimated harvest of nearly 1.1 million crab shows association. Estimated catches of undersized males and females were each nearly 2.5 million. Incidental catch of Tanner crabs was approximately 1.5 million; 56 percent being legal sized males and 5.3 percent were females. Pacific cod probably totalled over 82,000 for the season.

Length frequency and shell age distributions of red king males and females examined in pot samples over the past three years are shown in Figures 27 and 28, and Table 34. The average size of all males inspected in 1992 was 125 mm CL compared to averages of 139 mm in 1991 and 142 mm in 1990. Slightly over 14 percent of the males sampled in 1992 were characterized as skip molts (Table 34). Females captured in the 1992 fishery averaged 103 mm and showed a slight increase from the 99 mm average observed in 1991.

Ovigerous females dominated a sample of 2,378 crabs measured in the 1992 fishery; uneyed females comprised 68 percent, eyed females were 16.3 percent, 1.9 percent were mated but barren, and 13.8 percent were barren with no signs of annual mating activity (Table 35). Similarities of the 1992 sampling results to reproductive conditions of female red king crabs examined in the 1990 and 1991 fisheries are evident only in the numbers of individuals bearing clutches of uneyed eggs (Figure 30). The proportion of barren/non-mated females examined in 1992 showed a 60 percent decline from 1991 statistics, yet still indicated a threefold increase over the 1990 pot sample results.

Adak Brown King Crab

Shellfish observers onboard catcher processors in the Adak area fishery have been the primary means for ADF&G to collect much needed descriptive biological information on brown king stocks inhabiting the Western Aleutians. Due to the expanse and remote nature of the region, and the limited amount of vessel effort, few other sources of comprehensive data are available to shellfish biologists. During the nine-month 1992 Adak season, 25 observers trips were completed on 7 catcher processors (Morrison et al. 1993).

A total of 57,628 retained males were measured in 1992 (Table 36), as opposed to 17,196 and 17,494 in 1990 and 1991 respectively (Figure 31). The average size of harvested crab was 148.4 mm, 144.7 mm and 147.2 mm during the consecutive three year period. Concurrent with these findings, the number of recruits (136 mm - 140 mm group) declined from 27.1 in 1991 to 19.4 the following year (Table 37).

Beginning with the 1990 fishery, pot catches consisted of a relatively high percentage of recruit and post-recruit males; the mean size from summarized data was slightly over 132 mm CL (Figure 32). Pot sample results from the following year seemed to indicate an increase of juvenile males in the 60 - 80 mm range. By 1992, this emerging age class had moved into the 90 to 110 mm range.

Female brown king size distributions are generally similar to that of the males. Although the average carapace length has remained constant over the last three seasons at about 120 and 121 mm CL, results from 1991 indicate an increase in numbers of immature individuals (Figure 33). The 1992 pot sampling showed many of these crab were still alive after completing a seasonal molt.

With the advent of observer coverage, catcher processor retention of illegally retained crabs has diminished in the Adak fishery. More than 37 percent of the 762,111 crabs harvested by catcher processors during the 1992 season (Griffin 1993) were examined by onboard observers; six-tenths

of one percent were documented as undersized males, females or out-of-season species (Table 38). Deliveries of Adak brown king crabs by catcher vessels were not subject to size/sex/species regulations compliance monitoring by shellfish observers in 1992 as floating processor vessels did not participate in the fishery. However, a number of catcher vessel shoreside deliveries were sampled by ADF&G personnel. The format of these data is not compatible with shellfish observer legal tally samples.

Crab, fish and other invertebrate species are landed incidentally in pots during the Adak season; species of commercial value are listed in Table 39. Pots are set on long-line strings at depths ranging from 200 to 400 fms, with a mean depth derived from pot sample data (in 1992) of 248 fathoms. A total of 888 pots were sampled by observers, nearly all of which were selected from long-line fishing gear.

Sub-legal sized brown king males, and females were the dominant shellfish components in bycatch pots during the 1992 season. Of the 24,795 brown kings enumerated in pot samples, greater than 73 percent were released. Mean catch per pot of legal-sized males were 7.4 crabs. These statistics are consistent with data collected in the 1990 and 1991 fisheries; ratios of released to retained brown crabs were essentially 3:1 during each of the three respective years (Figure 34). Significant catches of red king crabs have also been observed in data summarized from the last two years. This may be partly due to directed fishing effort for that species even though the vessel(s) continued to utilize traditional long-line brown king crab gear.

Shell ages of males and females studied in pot samples in 1992 were virtually identical and confirmed the trend from 1990 and 1991 (Table 40). According to Sloan (1985), studies of fjord-dwelling brown king crabs in northern British Columbia revealed similar life history characteristics to the Adak population even though the Canadian stocks are apparently not subject to significant commercial exploitation.

Individual studies of brown king crab reproductive cycles have demonstrated that females are typically aseasonal spawners with corresponding portions of the population mating at various times of the year (Sloan 1984 and 1985). Data generated from the 1992 Adak fishery depicts sizable numbers of females observed as ovigerous (bearing either eyed or uneyed egg clutches), and mated or non-mated (Figure 35). Proportions of each reproductive stage observed in females from the 1990, 1991, and 1992 fisheries are as follows: 23.4 percent eyed eggs, 31.9 percent uneyed eggs, 11.0 percent mated (matted setae), 33.7 percent non-mated (clean setae) (Table 41).

Adak Red King Crab

Historically, the Adak red king crab fishery was the primary economic shellfish interest in the Western Aleutians. During the 1960s and early 1970s, commercial harvests in excess of 15 million pounds were not uncommon amongst a fleet ranging from 10 and 40 vessels (Griffin 1993). Annual catches of red kings have declined to below one million pounds annually due to severely depressed stocks and the shifting of vessel effort toward brown king crab harvest.

Retained crab length frequency information collected from various processing locations was not available for summary from the Adak red king seasons prior to 1992. Of the 5,195 crabs measured during that fishery, 4,128 were sampled by observers on catcher processors (Table 42). Individual carapace lengths ranged between 151.3 and 157.1 millimeters, depending on the delivery location of sampled crabs. Overall, the largest numbers of retained males occurred in the 145 - 150 mm range (Table 43 and Figure 36).

The 1990 and 1991 red king male size frequency distributions, from pot samples, were pooled for comparative purposes. Based on average shell sizes and overall age distributions from each respective year, it appears that significant recruitment into the population may have occurred between the 1991 and 1992 fisheries (Figure 37). The increase in mean carapace length from 129 mm in 1991 to 135 mm in 1992 may support this assessment.

Female red king crab size distributions from each of the prior three consecutive seasons were derived from small catches in pot surveys. The fact that female red kings have not been commonly observed in the Adak fishery probably signifies a lack of geographical overlap between both sexes during the period of commercial harvest. Typical carapace lengths of female crabs in the 1991 fishery increased 5 mm to an average of 113mm CL compared to the mean size 108 mm noted in 1990. The overall range of female age classes appeared to diminish from previous years up to 1992.

Of the .13 million red king crabs harvested by catcher processors and floating processors in the 1992 season (Griffin 1993), 21 percent were inspected by shellfish observers for legal size (Table 44). Of these, a total of 209 males were recorded as being smaller than the 6.5 inch carapace width size limit stipulated for the area.

Molt staging statistics of red king males and females examined in sampled pots during 1992 were similar to data gathered from the prior two seasons (Table 45). Approximately 90 percent of all males were described as new shells; the remainder were nearly all first year skip molts. All female red kings were assessed as new shell crabs in 1992. These findings were again virtually identical to results of observer sampling the previous two years.

Most female red kings examined for signs of ovigerity during the last Adak season contained clutches of eyed eggs (Table 46). Visible eggs were completely absent in 25 females, 19 of which showed no signs of annual mating activity. The 1992 statistics would support the generally accepted assumption of a seasonal (probably late spring) spawning cycle for the Adak stocks. Conversely, red king females observed in the 1990 and 1991 fisheries displayed a different molting schedule (Figure 39).

Bering Sea C. bairdi (Tanner Crab)

Shellfish observer data summarized from the 1990, 1991, and 1992 Bering Sea fisheries is presented in this report using two separate chronological demarcations to define the fishery. Dating back to 1985, the *C. bairdi* season traditionally opened to commercial harvest effort on January 15. Beginning in 1990, due to action taken by the Alaska Board of Fisheries, the fishery opened on January 15, closed on April 26, and then re-opened on November 20. The November

season, in accordance with the intent of the B.O.F., began 7 days following the closure of the Bristol Bay red king crab fishery (Griffin 1993).

This change in season scheduling has allowed for compilation of observer pot sampling data independent from the overlapping *C.opilio* fishery. Since most vessels retain both *C. bairdi* and *C. opilio* in the concurrent segment of the seasons, it is difficult to identify a pot sample derived from exclusively directed *C. bairdi* effort. Therefore, all sampling figures, with regard to catches per pot, have been extracted only from data sets generated in the fishery prior to January 1 during each year. Conversely, all biological statistics such as size frequencies, shell ages and reproductive condition of females have been assembled from *C. bairdi* sampled by shellfish observers throughout the entire course of both fisheries.

Close to .2 million retained male *C. bairdi* were measured for size distribution during the 1992 fishery (Table 47). Length distributions from observers and ADF&G dockside retained crab data collections were essentially the same. Overall, the average width of a retained *C. bairdi* male decreased slightly from 150.4 mm CW in 1991 to 148.0 mm CW in the 1992 fishery (Table 48, Figure 40).

Carapace widths of all *C. bairdi* males (examined in pot samples) are provided in Figure 41. Though the mean size of crabs has remained constant at about 136 mm CW for the past seasons, a slight reduction in numbers of the post-recruit age classes evident in the 1992 season.

The incidence of terminal molt in female *C. bairdi* size distributions has apparently increased (Figure 42). As was the case with males, the average sizes of female Tanners were 99, 96 and 95 mm CW respectively during the 1990, 1991, and 1992 seasons.

The retention rate of undersized *C. bairdi* males was somewhat higher amongst the catcher vessel fleet compared to the catcher processors (Table 49). Approximately 1 percent of the .5 million crabs sampled by observers were smaller than the 5.5 size limit. The occurrence of female *C. bairdi* was relatively insignificant with 196 crabs recorded.

As mentioned previously, shellfish observer catch per pot results from the Bering Sea *C. bairdi* fishery have been assembled for each season only from the November opening date through December 31. In 1992, the most abundant crab species per pot appeared to be undersized *C. bairdi* males. From a sample of 517 pots, the average catch of sub-legal male *C. bairdi* was 42.3 (Table 50). Female red kings were the dominant king crab bycatch with an average of 2.2 crabs per pot documented over the course of the fishery. Using the 492,565 pot pulls reported on fish tickets between November 15 and December 31 (Griffin 1993), an estimated catch of slightly over one million female red kings were captured and released.

Differences in the species/sex composition from the previous three year period are provided in Figure 43. Notably, the average catch of legal sized male *C. opilio* declined from over 41 in 1991 to 5.3 in 1992. Factors contributing to this reduction in bycatch other than an overall decrease in abundance can be attributed a shift in fishing effort locale away from historically productive *C. bairdi* grounds in the area adjacent to the Pribilof Islands. Historic abundance

surveys have disclosed important concentrations of *C. opilio* in the area around the Pribilof islands as well (Macintosh and Stevens 1990, Stevens et al. 1991).

In 1992, 80 - 90 percent of *C. bairdi* males examined were assessed as having completed a molt cycle within the previous 12 months; a pattern established in the 1990 and 1991 fisheries (Table 51).

The incidence of females described as first-year terminal molts rose nearly 45 percent in 1992 over the previous season. Conversely, the occurrence of females characterized as new shells (including juveniles), declined over 81 percent in the same period.

From a sample of 5,139 female *C. bairdi*, ovigerous crabs accounted for greater than 95 percent of the total and of these, 4,447 (86.5 percent) were characterized as containing clutches of uneyed eggs (Table 52). Barren females constituted a minor portion of the crabs surveyed; 1.1 percent were described as having clean setae. Over the past three seasons, the numbers of fecund female *C. bairdi* remained constant. However, the number of individuals bearing uneyed eggs increased (Figure 44). Concurrently, the numbers of females bearing clutches of eyed eggs, declined from 53.3 percent in 1990, to less than 10 percent of the sampled total in 1992.

Lost Pot/Biodegradable Escape Mechanism Surveys

Recently, two of the increasingly prominent topics of discussion concerning the Bering Sea/Aleutian crab fisheries have been the numbers of commercial fishing pots lost by vessels on an annual basis and, the percentage of fishing vessels in compliance with Alaska commercial shellfish biodegradable escape mechanism regulations. Concern over these two issues has focused on the prospect of significant amounts of lost gear dispersed through out the shellfish harvest grounds and "ghost fishing" for extended periods of time.

During selected 1992 Bering Sea/Aleutian Island fisheries and the 1993 Bering Sea *C. opilio* season, observers were instructed to document the incidence of lost gear on their respective vessel(s) over the course of their deployment. The lost pot statistics by fishery are the result of either actual observations by an individual observer or were generated from information provided to the observer by the vessel captain or crew. The estimated 6,508 pots lost during the course of the four fisheries listed is an estimate based on the average number of pots lost per vessel, the average number of pots fished per vessel, and the total number of reported pot pulls made in each respective fishery (Table 53).

During several 1992 fisheries, shellfish observers examined a minimum of 10 pots per day to assess the overall numbers of fished pots containing cotton twine biodegradable escape panels. A total 9,049 pots were examined over the course of five 1992 fisheries; 3.3 percent were documented as failing to meet the specified criterion defining a legal biodegradable escape panel (Table 54). All pots inspected by shellfish observers during the Dutch Harbor area brown king crab fishery were described as containing acceptable egress mechanisms; 72 of 997 pots inspected in the Bristol Bay area red king fishery did not meet escape panel specifications.

CONCLUSIONS

The collection of management information and descriptive biological data by shellfish observers has been, and continues to be, an integral component in establishing an extensive database for monitoring the near and long term dynamics of the Bering Sea/Aleutians crab populations. Valuable information with regard to recruitment, incidental bycatch of other species, and fishing operations has been utilized extensively by fishery managers in the brief period since the inception of the program.

Summarized shellfish observer data presented in this report is mostly a generalized compilation of current biological statistics on observed Bering Sea/Aleutian Islands fisheries. Certain problems still exist which may affect data integrity. These include aspects of sampling strategies and methodology. Recent changes in program administration have enhanced the quality of the observer database. Increased acceptance and support from the shellfish fleet and processing industry has promoted the usefulness of the observer program for compiling research and management information.

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Table 1. 1992 Bering Sea commercially retained *C. opilio* width frequency statistics by processor type.

Sample Type	Sample Size	Ave. Width	--- Shell Age Percentages --- New / Skip molt / 2nd skip		
Catcher processor	81,930	110.0mm	96.80	3.15	0.05
Floater processor	101,446	112.7mm	98.50	1.47	0.03
Shoreside processor	25,216	113.9mm	93.44	6.23	0.32
Totals	208,592	112.2mm	96.25	3.62	0.13

Table 2. Bering Sea commercially retained *C. opilio* crab width frequencies from 1990, 1991, and 1992 fisheries.

Width (mm)	1990 num. of crab	1990 % of Sample	1991 num. of crab	1991 % of sample	1992 num. of crab	1992 % of sample
086 - 090	281	1.0	146	0.4	860	0.5
091 - 095	1,084	3.4	784	1.9	2,905	1.7
096 - 100	3,529	11.0	3,179	7.9	8,895	5.3
101 - 105	6,791	21.2	7,619	18.9	21,925	13.0
106 - 110	6,790	21.2	9,895	24.5	33,285	19.8
111 - 115	5,527	17.2	8,671	21.5	37,814	22.5
116 - 120	4,269	13.3	5,928	14.7	31,869	18.9
121 - 125	2,537	7.9	3,028	7.5	19,315	11.5
126 - 130	876	2.7	904	2.2	8,131	4.8
131 - 135	196	0.6	148	0.4	2,343	1.4
Totals	31,880[a]	99.5[b]	40,302	99.9	167,342	99.4
	mean size = 109.1mm		mean size = 111.0mm		mean size = 112.2mm	

[a] Total sample numbers do not include width frequencies outside the listed ranges.
[b] Percentages do not include width frequencies outside the listed range.

Table 3. Illegally retained crab observed in the 1992 Bering Sea *C. opilio* fishery by sample type including *C. opilio* undersized male and female crabs.

Sample type	Sample[a] size	Undersized males No./ % sample		Females No./ % sample		Total % illegals	Total crabs harvested	Est. total[b] illegals	% Harvest sampled
Catcher[c] Processor	858,408	696	<.1	460	<.1	.1	23,741,672	31,972	3.6
Floater[d] Processor	588,634	539	.1	244	<.1	.1	91,723,897	122,011	.6
Totals	1,447,042	1,235	.1	704	<.1	.1	115,465,569	154,720	1.3

[a] Includes all species and sexes of crab recorded in C. opilio catch samples.
[b] Estimates derived from percentages of illegal crab X total numbers of crab harvested during the fishery.
[c] Catcher processor figures based upon legal measurements of 600 retained crab on each vessel per fishing day.
[d] Floater processor figures based upon legal measurements of 600 retained crab per each catcher vessel delivery.

Table 4. Illegally retained *C. bairdi* observed in the 1992 Bering Sea *C. opilio* fishery by sample type including *C. bairdi* undersized and out-of-season male and female crabs.

Sample type	Sample[a] size	Males No./ % sample		Females No./ % sample		Total % illegals	Total crabs[b] harvested	Est. total[c] illegals	% Harvest sampled
Catcher[d] Processor	858,408	3,301	.4	141	<.1	.4	23,741,672	95,198	3.6
Floater[e] Processor	585,659	2,123	.4	63	<.1	.4	91,723,897	342,364	.6
Totals	1,439,467	5,424	.4	204	<.1	.4	115,465,569	451,445	1.3

[a]Includes only *C. opilio* catches sampled prior to and following the 1992 Bering Sea *C. bairdi* season closure.
[b]1992 Bering Sea *C. opilio* harvest.
[c]Estimates derived from percentage of illegal crab X total numbers of crab harvested during the fishery.
[d]Catcher processor figures based upon legal measurements of 600 retained crab on each vessel per fishing day.
[e]Floater processor figures based upon legal measurements of 600 retained crab per each catcher vessel delivery.

Table 5. Catch per pot of commercially important species from the 1992 Bering Sea *C. opilio* fishery.

Species	Total pot[a] sample catch	Catch per unit effort	Estimated total[b] fishery catch
C. opilio			
legal male	253,995	208.9	267,767,184
sub-legal male	1,857	1.5	1,922,694
female	3,855	3.2	4,101,747
C. bairdi			
legal male	3,194	2.6	3,332,670
sub-legal male	9,886	8.1	10,382,548
female	958	.8	1,025,437
hybrid Tanner crab			
mixed size/sex	8,083	6.6	8,459,854
red king crab			
legal male	20	<.1	21,082
sub-legal male	2	<.1	2,108
female	10	<.1	10,541
blue king crab			
legal male	9	<.1	9,487
sub-legal male	19	<.1	20,028
female	3	<.1	3,162
brown king crab[c] (legal males only)	6	<.1	6,325
halibut	15	<.1	15,812
pacific cod	1,119	.9	1,179,547

[a] Total pot contents derived from 1,216 random samples taken on catcher processors during the fishery.

[b] Estimated catch derived from pot sample CPUE x 1,281,796 total reported pot pulls during the fishery.

[c] Only legal males were observed in pot samples.

Table 6. Shell age distributions of male and female crabs observed in the 1990, 1991, and 1992 Bering Sea *C. opilio* fisheries.

Fishery year	Sample size[a]	Shell age classes: New	% total	Skip molt	% total	2nd skip	% total
1990							
Males	494	471	95.3	22	4.5	1	0.2
Females	0	-	-	-	-	-	-
1991							
Males	116,430	106,107	91.1	8,845	7.6	1,478	1.3
Females	8,565	2,739	32.0	4,981	58.2	845	9.8
1992							
Males	121,432	115,095	94.8	5,613	4.6	724	.6
Females	1,367	231	16.9	873	63.9	263	19.2

[a] Derived from random pot contents samples taken on catcher processors during the fisheries.

Table 7. Reproductive state of female *C. opilio* observed in pot samples from the 1990, 1991, and 1992 Bering Sea *C. opilio* fisheries.

Fishery year	No. females eyed eggs	% of total	No. females uneyed eggs	% of total	No. females mated/barren	% of total	No. females non-mated	% of total
1990								
9 pots 0 crab	-	-	-	-	-	-	-	-
1991								
1,677 pots 8,449 crab	687	8.1	6,119	72.4	806	9.5	837	9.9
1992								
1,216 pots 1,292 crab	827	64.0	150	11.6	215	16.8	100	7.7
Total 9,741 crab	1,514	15.5	6,269	64.4	1,021	10.5	937	9.6

Table 8. 1992 Bering Sea commercially retained brown king crab length frequency statistics by processor type.

Sample type	Sample size	Ave. length	--- Shell age percentages --- New / Skip molt / 2nd skip		
Catcher processor	153	141.9mm	91.50	7.84	0.65
Floater[a] processor	N/A	-	-	-	-
Shoreside[b] processor	N/A	-	-	-	-
Totals	153	141.9mm	91.50	7.84	0.65

[a]Crab processing was not conducted on floater processor vessels during this fishery.
[b]Shoreside deliveries of crab harvested in this fishery were not sampled in 1992.

Table 9. Bering Sea commercially retained brown king crab length frequencies from the 1992 fishery.

Length (mm)	1992 number of crab	1992 percent of sample
126 - 130	14	9.2
131 - 135	23	15.0
136 - 140	24	15.7
141 - 145	32	20.9
146 - 150	26	17.0
151 - 155	17	11.1
156 - 160	10	6.5
161 - 165	1	0.7
166 - 170	0	-
171 - 175	1	0.7
Totals	148[a]	96.8[b]
	mean size = 141.9mm	

[a] Total sample numbers do not include length frequencies outside the listed ranges.

[b] Percentages do not include lengths outside the listed range.

Table 10. Catch per pot of commercially important species from the 1992 Bering Sea brown king crab fishery.

Species	Total pot[a] sample catch	Catch per unit effort	Estimated total[b] fishery catch
brown king crab			
legal male	30	2.0	1,596
sub-legal male	162	10.8	8,618
female	113	7.5	5,985
C. Tanneri			
legal male	72	4.8	3,830
sub-legal male	0	-	-
female	1	<.1	53
Lithodes couesi			
legal male	5	.3	266
sub-legal male	0	-	-
female	0	-	-
sablefish	**1**	**<.1**	**53**
pacific cod	2	.1	106
octopus	2	.1	106

[a] Total pot contents derived from 15 random samples taken on one catcher processor during the fishery.

[b] Estimated catch derived from pot sample CPUE x 798 total reported pot pulls during the fishery.

Table 11. Shell age distributions of brown king crabs and *C. tanneri* observed in the 1992 Bering Sea brown king crab fishery.

Fishery year	Sample size[a]	Shell age classes: New	% total	Skip molt	% total	2nd skip	% total
brown king							
Males	192	181	94.3	10	5.2	1	0.5
Females	113	102	90.3	10	8.8	1	0.9
C. tanneri							
Males	72	67	93.1	5	6.9	0	-
Females	2	1	50.0	1	50.0	0	-

[a] Derived from 15 random pot contents samples taken on one catcher processor during the fishery.

Table 12. Reproductive state of female brown king crabs observed in pot samples from the 1992 Bering Sea brown king crab fishery.

Fishery year	No. females eyed eggs	% of total	No. females uneyed eggs	% of total	No. females mated/barren	% of total	No. females non-mated	% of total
1992								
15 pots								
100 crab	1	1.0	12	12.0	2	2.0	85	85.0
Total	1	1.0	12	12.0	2	2.0	85	85.0
100 crab								

Table 13. 1992 St. Matthew commercially retained blue king crab length frequency statistics by processor type.

Sample type	Sample size	Ave. length	--- Shell age percentages --- New / Skip molt / 2nd skip		
Catcher processor	2,120	132.9mm	90.80	8.40	1.37
Floater processor	10,192	133.1mm	78.73	19.14	1.94
Shoreside processor	1,897	134.1mm	91.10	8.90	-0-
Totals	14,209	133.2mm	82.10	16.17	1.60

Table 14. St. Matthew commercially retained blue king crab length frequencies from 1990, 1991, and 1992 fisheries.

Length (mm)	1990 num. of crab	1990 % of sample	1991 num. of crab	1991 % of sample	1992 num. of crab	1992 % of sample
111 - 115	2	0.1	13	0.1	22	0.2
116 - 120	96	2.4	387	2.7	429	3.0
121 - 125	452	11.4	1,663	11.5	2,112	14.9
126 - 130	962	24.3	2,749	19.0	3,120	22.0
131 - 135	978	24.7	3,571	24.6	3,247	22.8
136 - 140	649	16.4	3,111	21.5	2,683	18.8
141 - 145	309	7.8	1,740	12.0	1,576	11.1
146 - 150	218	5.5	860	5.9	746	5.3
151 - 155	215	5.4	310	2.1	202	1.4
156 - 160	56	1.4	72	0.5	57	0.4
Totals	3,935[a]	99.4[b]	14,476	99.9	14,194	99.9
	mean size = 134.3mm		mean size = 134.1mm		mean size = 133.2mm	

[a] Total sample numbers do not include length frequencies outside the listed ranges.
[b] Percentages do not include length frequencies outside the listed range.

Table 15. Illegally retained crabs observed in the 1992 St. Matthew Blue king crab fishery by sample type including undersized males, females, and other crabs.

Sample type	Sample size	Undersized males No./ % sample		Females No./ % sample		Number of other crab	Total % illegals	Total crabs harvested	Est. total[a] illegals	% Harvest sampled
Catcher[b] Processor	17,166	87	.5	19	.1	0	.6	82,179	507	20.9
Floater[c] Processor	58,917	153	.3	40	<.1	2	.3	338,843	1,121	17.4
Totals	76,083	240	.3	59	<.1	2	.4	421,022	1,666	18.1

[a] Estimates derived from percentage of illegal crab X total numbers of crab harvested during the fishery.
[b] Catcher processor figures based upon legal measurements of 600 retained crab on each vessel per fishing day.
[c] Floater processor figures based upon legal measurements of 600 retained crab per each catcher vessel delivery.

Table 16. Catch per pot of commercially important species from the 1992 St. Matthew blue king crab fishery.

Species	Total pot[a] sample catch	Catch per unit effort	Estimated total[b] fishery catch
blue king			
legal male	982	14.0	792,820
sub-legal male	1,721	24.6	1,393,098
female	4,227	60.4	3,420,452
C. opilio			
legal male	37	.5	28,315
sub-legal male	0	-	-
female	0	-	-
red king			
male	0	-	-
female	0	-	-
pacific cod[c]	19	.3	16,989
yellowfin sole	178	2.5	141,575

[a] Total pot contents derived from 70 random samples taken on catcher processors during the fishery.

[b] Estimated catch derived from pot sample CPUE x 56,630 total reported pot pulls during the fishery.

[c] All fish species mixed size and sex.

Table 17. Shell age distributions of male and female crabs observed in the 1990, 1991, and 1992 St. Matthew blue king crab fisheries.

Fishery year	Sample size11[a]	Shell age classes: New / % total		Skip molt / % total		2nd skip / % total	
1990							
Males	156	128	82.1	28	17.9	0	-
Females	27	14	51.8	13	48.2	0	-
1991							
Males	3,960[b]	3,539	89.4	364	9.2	14	.4
Females	2,037[c]	3,306	73.9	481	23.6	9	.4
1992							
Males	2,099	1,906	90.8	179	8.5	14	.7
Females	3,083	2,928	80.3	603	19.6	3	.1

[a] Derived from random pot contents samples taken on catcher processors during the fisheries.
[b] Includes 43 new/soft shell males observed.
[c] Includes 41 new/soft shell females observed.

Table 18. Reproductive state of female blue king crabs observed in pot samples from the 1990, 1991, and 1992 St. Matthew fisheries.

Fishery year	No. females eyed eggs	% of total	No. females uneyed eggs	% of total	No. females mated/barren	% of total	No. females non-mated	% of total
1990								
10 pots								
27 crab	0	-	0	-	13	48.1	14	51.9
1991								
124 pots								
2,110 crab	1	<.1	7	.3	821	38.9	1,281	60.7
1992								
70 pots								
3,061 crab	4	.1	6	.2	1,642	53.6	1,409	46.1
Total 5,198 crab	5	<.1	13	.3	2,476	47.6	2,704	52.0

Table 19. 1992 Dutch Harbor commercially retained brown king crab length frequency statistics by processor type.

Sample type	Sample size	Ave. length	--- Shell age percentages --- New / Skip molt / 2nd skip		
Catcher processor	14,832	147.8mm	95.41	4.17	0.36
Floater[a] processor	N/A	-	-	-	-
Shoreside[b] processor	N/A	-	-	-	-
Totals	14,832	147.8mm	95.41	4.17	0.36

[a] Crab processing was not conducted on floater processor vessels during this fishery.
[b] Shoreside deliveries of crab harvested in this fishery were not sampled in 1992.

Table 20. Dutch Harbor commercially retained brown king crab length frequencies from the 1990, 1991, and 1992 fisheries.

Length (mm)	1990 num. of crab	1990 % of sample	1991 num. of crab	1991 % of sample	1992 num. of crab	1992 % of sample
126 - 130	17	0.5	82	0.1	69	0.5
131 - 135	176	5.7	996	6.4	1,105	7.5
136 - 140	435	14.0	2,730	17.5	2,467	16.6
141 - 145	521	16.8	3,291	21.1	3,182	21.5
146 - 150	456	14.7	3,028	19.4	2,786	18.8
151 - 155	422	13.6	2,240	14.4	2,118	14.3
156 - 160	365	11.8	1,545	9.9	1,498	10.1
161 - 165	272	8.8	881	5.6	872	5.8
166 - 170	221	7.1	411	2.6	459	3.1
171 - 180	120	3.9	212	1.4	182	1.2
181 - 185	94	3.0	109	0.7	58	0.4
Totals	3,099[a]	99.9[b]	15,525	99.1	14,796	99.8
	mean size = 152.7mm		mean size = 147.9mm		mean size = 147.8mm	

[a] Total sample numbers do not include length frequencies outside the listed ranges.
[b] Percentages do not include length frequencies outside the listed range.

Table 21. Illegally retained crab observed in the 1992 Dutch Harbor brown king crab fishery by sample type including undersized males, females and other crabs.

Sample type	Sample size	Undersized males No./ % sample		Females No./ % sample		Number of other crab	Total % illegals	Total crabs harvested	Est. total[a] illegals	% Harvest sampled
Catcher[b] Processor	65,871	525	.8	63	.1	1	.9	93,617	837	70.4
Floater[c] Processor	----------					N/A	----------			
Totals	65,871	525	.8	63	.1	1	.9	93,617	837	70.4

[a] Estimates derived from percentage of illegals X total numbers of crab harvested during the fishery.
[b] Catcher processor figures based upon legal measurements of 600 retained crab on each vessel per fishing day.
[c] Floater processors did not participate in the 1992 Dutch Harbor brown king crab fishery.

Table 22. Catch per pot of commercially important species from the 1992 Dutch Harbor brown king crab fishery.

Species	Total pot[a] sample catch	Catch per unit effort	Estimated total[b] fishery catch
brown king			
legal male	976	6.3	237,617
sub-legal male	2,427	15.8	595,928
female	3,293	21.4	807,144
L. couesi			
retained male	0	-	-
non-retained male	15	.1	3,771
female	15	.1	3,771
C. tanneri			
mixed size/sex	4	<.1	980
pacific cod[c]	84	.5	18,859
sablefish	22	.1	5,388
halibut	22	.1	5,388
rockfish spp	11	<.1	2,694

[a] Total pot contents derived from 154 random samples taken on catcher processors during the fishery.
[b] Estimated catch derived from pot sample CPUE x 37,717 total reported pot pulls during the fishery.
[c] All fish species mixed size and sex.

Table 23. Shell age distributions of males and females observed from the 1990, 1991, and 1992 Dutch Harbor brown king crab fisheries.

Fishery year	Sample size[a]	Shell age classes: New	% total	Skip molt	% total	2nd skip	% total
1990							
Males	3,234	3,106	96.0	115	3.6	13	.4
Females	3,822	3,707	97.0	103	2.7	12	.3
1991							
Males	3,832	3,720	97.2	108	2.8	4	<.1
Females	3,526	3,306	93.7	218	6.2	2	<.1
1992							
Males	3,087	2,994	97.0	86	2.8	7	.2
Females	3,179	2,928	92.1	239	7.5	12	.4

[a] Derived from random pot contents samples taken on catcher processors during the fisheries.

Table 24. Reproductive state of female brown king crab observed in pot samples from the 1990, 1991, and 1992 Dutch Harbor fisheries.

Fishery year	No. females eyed eggs	% of total	No. females uneyed eggs	% of total	No. females mated/barren	% of total	No. females non-mated	% of total
1990								
139 pots								
3,317 crab	762	23.0	874	26.3	52	1.6	1,629	49.1
1991								
299 pots								
3,509 crab	695	19.8	916	26.1	336	9.6	1,562	44.5
1992								
154 pots								
3,179 crab	617	19.4	838	26.3	273	8.6	1,451	45.6
Total	2,074	20.7	2,628	26.3	661	6.6	481	4.8
10,005 crab								

Table 25. 1992 Bering Sea commercially retained Korean hair crab length frequency statistics by processor type.

Sample type	Sample size	Ave. length	----- Shell age percentages ----- Soft / New / Skip molt / 2nd skip			
Catcher processor	800	83.1mm	0.00	90.13	8.00	1.88
Floater[a] processor	N/A	-	-	-	-	-
Shoreside[b] processor	N/A	-	-	-	-	-
Totals	800	83.1mm	0.00	90.13	8.00	1.88

[a] Crab processing was not conducted on floater processor vessels during this fishery.
[b] Samples taken from shoreside deliveries of crab harvested in this fishery were not available for summary.

Table 26. Bering Sea commercially retained Korean hair crab length frequencies from the 1992 fishery.

Length (mm)	1992 number of crab	1992 percent of sample
061 - 065	3	0.2
066 - 070	19	1.3
071 - 075	141	9.3
076 - 080	339	22.4
081 - 085	425	28.0
086 - 090	339	22.4
091 - 095	153	10.1
096 - 100	43	2.8
101 - 105	24	1.6
106 - 110	16	1.1
Totals	1,502[a]	99.2[b]
	mean size = 83.6mm	

[a] Total sample numbers do not include length frequencies outside the listed ranges.

[b] Percentages do not include length frequencies outside the listed range.

Table 27. Catch per pot of commercially important species from the 1992 Bering Sea Korean hair crab fishery.

Species	Total pot[a] sample catch	Catch per unit effort	Estimated total[b] fishery catch
Korean hair crab			
retained male[c]	1,029	8.9	1,506,334
non-retained male	886	7.7	1,303,233
female	21	.2	33,850
C. bairdi			
legal male	65	.6	101,551
sub-legal male	267	2.3	389,277
female	20	.2	33,850
red king crab			
legal male	52	.5	84,626
sub-legal male	19	.2	33,850
female	8	<.1	11,773
blue king crab			
legal male	4	<.1	5,887
sub-legal male	6	<.1	8,830
female	33	.3	48,567
C. opilio (legal males only)	3	<.1	4,415
pacific cod	11	.1	16,189

[a] Total pot contents derived from 115 random samples taken on fishing vessels during the fishery.

[b] Estimated catch derived from pot sample CPUE x 169,251 total reported pot pulls during the fishery.

[c] No size limit has been established in regulation for this species.

Table 28. Shell age distributions of males and females observed in pot samples from the 1992 Bering Sea Korean hair crab fishery.

Fishery year	Sample size[a]	Shell age classes					
		New	% total	Skip molt	% total	2nd skip	% total
Males	1,815	1,681	92.6	133	7.3	1	<.1
Females	21	10	47.6	10	47.6	1	4.8

[a] Derived from 115 random pot contents samples taken on three vessels during the fishery.

Table 29. Reproductive state of female Korean hair crab observed in pot samples taken from the 1992 Bering Sea Korean hair crab fishery.

Fishery year	No. females eyed eggs	% of total	No. females uneyed eggs	% of total	No. females mated/barren	% of total	No. females non-mated	% of total
1992								
115 pots								
19 crab	1	5.3	3	15.8	1	5.3	14	73.7
Total	1	5.3	3	15.8	1	5.3	14	73.7
19 crab								

Table 30. 1992 Bristol Bay commercially retained red king crab length frequency statistics by processor type.

Sample type	Sample size	Ave. length	--- Shell age percentages --- New / Skip molt / 2nd skip		
Catcher processor	9,255	152.7mm	74.58	20.95	4.44
Floater processor	5,877	153.1mm	83.95	14.59	1.44
Shoreside processor	8,420	152.7mm	76.61	21.61	1.76
Totals	23,552	152.8mm	77.65	19.60	2.73

Table 31. Bristol Bay commercially retained red king crab length frequencies from the 1990, 1991, and 1992 fisheries.

Length (mm)	1990 num. of crab	1990 % of sample	1991 num. of crab	1991 % of sample	1992 num. of crab	1992 % of sample
131 - 135	925	2.3	813	2.3	602	2.6
136 - 140	4,350	10.9	3,818	10.8	2,172	9.2
141 - 145	6,813	17.1	6,054	17.0	3,605	15.3
146 - 150	7,178	18.0	6,468	18.2	3,949	16.8
151 - 155	6,673	16.7	5,178	16.5	4,126	17.5
156 - 160	5,644	14.2	4,941	13.9	3,435	14.5
161 - 165	4,313	10.8	3,747	10.6	2,633	11.3
166 - 170	2,523	6.3	2,230	6.3	1,707	7.3
171 - 175	1,013	2.5	1,109	3.1	863	3.7
176 - 180	295	1.0	343	1.0	316	1.3
Totals	39,772[a]	99.8[b]	34,701	99.7	23,408	99.5
	mean size = 151.8mm		mean size = 151.9mm		mean size = 152.8mm	

[a] Total sample numbers do not include length frequencies outside the listed ranges.
[b] Percentages do not include length frequencies outside the listed range.

Table 32. Illegally retained crab observed in the 1992 Bristol Bay red king crab fishery by sample type including undersized males, females and other crabs.

Sample type	Sample size	Undersize males No./ % sample		Females No./ % sample		Tanner male/female		Total % illegals	Total crabs harvested	Est. total[a] illegals	% Harvest sampled
Catcher[b] Processor	38,758	204	.53	16	.04	16	3	.62	118,684	731	32.6
Floater[c] Processor	34,058	179	.53	12	.04	25	3	.63	439,528	2,826	7.7
Totals	72,816	383	.53	28	.04	41	6	.62	558,212	3,511	13.0

[a] Estimates derived from percentage of illegal crab X total numbers of crab harvested during the fishery.
[b] Catcher processor figures based upon 600 legal measurements per vessel for each day of the fishery.
[c] Floater processor figures based upon 600 legal measurements for each vessel delivery.

Table 33. Catch per pot of commercially important species from the 1992 Bristol Bay red king crab fishery.

Species	Total pot[a] sample catch	Catch per unit effort	Estimated total[b] fishery catch
red king crab			
legal male	1,520	5.2	1,070,472
sub-legal male	3,235	11.2	2,305,632
female	3,203	11.7	2,408,562
C. bairdi			
legal male	1,213	4.2	864,614
sub-legal male	832	2.9	596,994
female	107	.4	82,344
C. opilio			
legal male	18	.1	20,586
sub-legal male	0	-	-
female	0	-	-
pacific cod[c]	121	.4	82,344
yellowfin sole	216	.7	144,102
halibut	7	<.1	4,986

[a] Total pot contents derived from 289 random samples taken on catcher processors during the fishery.

[b] Estimated catch derived from pot sample CPUE x 205,860 total reported pot pulls during the fishery.

[c] All fish species mixed size and sex.

Table 34. Shell age distributions of males and females observed in the 1990, 1991, and 1992 Bristol Bay red king crab fisheries.

Fishery year	Sample size[a]	Shell age classes					
		New	% total	Skip molt	% total	2nd skip	% total
1990							
Males	2,484	2,106	84.8	329	13.2	49	2.0
Females	696	692	99.5	4	.5	-	-
1991							
Males	4,690	4,196	89.5	443	9.4	51	1.1
Females	376	375	99.9	1	<.1	-	-
1992							
Males	4,747	4,077	85.9	582	12.3	88	1.8
Females	2,381	2,369	99.5	12	.5	-	-

[a] Derived from random pot contents samples taken on catcher processors during the fisheries.

Table 35. Reproductive state of female red king crabs observed in pot samples from the 1990, 1991, and 1992 Bristol Bay fisheries.

Fishery year	No. females eyed eggs	% of total	No. females uneyed eggs	% of total	No. females mated/barren	% of total	No. females non-mated	% of total
1990								
140 pots								
696 crab	284	40.8	376	54.0	4	.6	32	4.6
1991								
272 pots								
366 crab	25	6.8	218	59.6	1	.3	122	33.3
1992								
289 pots								
2,378 crab	386	16.3	1,619	68.0	46	1.9	327	13.8
Total	695	20.2	2,213	64.3	51	1.5	481	14.0
3,440 crab								

Table 36. 1992 Adak commercially retained brown king crab length frequency statistics by processor type.

Sample type	Sample size	Ave. length	--- Shell age percentages --- New / Skip molt / 2nd skip		
Catcher processor	50,869	147.0mm	92.73	6.10	.90
Floater processor	294	148.6mm	85.37	13.95	.68
Shoreside[a] processor	N/A	-	-	-	-
Totals	51,163	147.8mm	89.10	10.04	.80

[a] Shoreside length frequency data not available from this fishery.

Table 37. Adak commercially retained brown king crab length frequencies from the 1990, 1991, and 1992 fisheries.

Length (mm)	1990 num. of crab	1990 % of sample	1991[a] num. of crab	1991[a] % of sample	1992 num. of crab	1992 % of sample
126 - 130	111	0.7	65	0.4	174	0.3
131 - 135	1,231	7.2	1,626	9.3	3,571	6.2
136 - 140	3,202	18.6	4,740	27.1	11,185	19.4
141 - 145	3,711	21.6	4,409	25.2	13,102	22.7
146 - 150	2,885	16.8	2,958	16.9	11,436	19.8
151 - 155	2,101	12.2	1,728	9.9	8,121	14.1
156 - 160	1,409	8.2	1,017	5.8	4,677	8.1
161 - 165	955	5.5	556	3.2	2,712	4.7
166 - 170	804	4.7	261	1.5	1,443	2.5
171 - 175	377	2.2	99	.6	746	1.3
Totals	16,786[a]	97.7[b]	17,459	99.9	57,167	99.1
	mean size = 148.4mm		mean size = 144.7mm		mean size = 147.2mm	

[a] Samples taken from catcher processors only
[b] Total sample numbers do not include length frequencies outside the listed ranges.
[c] Percentages do not include length frequencies outside the listed range.

Table 38. Illegally retained crab observed in the 1992 Adak area king crab fishery by sample type including undersized males, females and other crabs.

Sample type	Sample size	Undersized males No./ % sample		Females No./ % sample		Number of other crab	Total % illegals	Total crabs harvested	Est. total[a] illegals	% Harvest sampled
Catcher[b] Processor	285,342	1,671	.6	166	<.1	0	.64	762,111	4,877	37.4
Floater[c] Processor	----------					N/A	----------			
Totals	285,342	1,267	.6	166	<.1	0	.64	762,111	4,877	37.4

[a] Estimate derived from percentage of illegal crab X total numbers of crab harvested during the fishery.
[b] Catcher processor figures based upon legal measurements of 600 retained crab on each vessel per fishing day.
[c] No records of observer deployment on floater processors exist for the 1991/92 fishery.

Table 39. Catch per pot of commercially important species from the 1992 Adak brown king crab fishery.

Species	Total pot[a] sample catch	Catch per unit effort	Estimated total[b] fishery catch
brown king crab			
legal male	6,645	7.4	1,427,823
sub-legal male	9,320	10.5	2,025,965
female	8,830	9.9	1,910,195
red king crab[c]			
legal male	1,072	1.2	231,539
sub-legal male	1,347	1.5	289,424
female	1,503	1.7	328,013
C. bairdi			
legal male	2	<.1	385
sub-legal male	43	<.1	7,718
female	38	<.1	7,718
L. couesi	155	.2	38,590
pacific cod	112	.1	19,295
halibut	44	<.1	9,647

[a] Total pot contents derived from 888 random samples taken on catcher processors during the fishery.

[b] Estimated catch derived from pot sample CPUE x 192,949 total reported pot pulls during the fishery.

[c] Red king crab catches may be partially attributable to directed effort for that species during the open season of 11/01 to 02/15.

Table 40. Shell age distributions of males and females observed in the 1990, 1991, and 1992 Adak brown king crab fisheries.

Fishery year	Sample size[a]	Shell age classes					
		New	% total	Skip molt	% total	2nd skip	% total
1990							
Males	34,706	30,113	86.8	3,736	10.8	153	.4
Females	19,165	16,962	88.5	1,796	9.3	93	.5
1991							
Males	7,469	7,057	94.5	288	3.9	37	.5
Females	5,061	4,834	95.5	212	4.2	4	.1
1992							
Males	16,731	15,675	93.7	933	5.5	90	.5
Females	8,001	7,491	93.5	499	6.2	15	.2

[a] Derived from random pot contents samples taken on catcher processors during the fisheries. Total sample sizes for each year and each sex contain small numbers of recorded soft shell crab.

Table 41. Reproductive state of female brown king crabs observed in pot samples from the 1990, 1991, and 1992 Adak brown king crab fisheries.

Fishery year	No. females eyed eggs	% of total	No. females uneyed eggs	% of total	No. females mated/barren	% of total	No. females non-mated	% of total
1990								
1,994 pots								
18,756 crab	4,356	23.2	6,122	32.6	1,835	9.8	6,443	34.4
1991								
653 pots								
4,913 crab	1,309	26.6	1,219	24.8	571	11.6	1,814	36.9
1992								
888 pots								
7,796 crab	1,690	25.1	2,710	34.8	1,060	13.6	2,336	30.0
Total	7,355	23.4	10,049	31.9	3,466	11.0	10,593	33.7
31,465 crab								

Table 42. 1992 Adak commercially retained red king crab length frequency statistics by processor type.

Sample type	Sample size	Ave. length	--- Shell age percentages --- New / Skip molt / 2nd skip		
Catcher processor	4,128	151.3mm	88.12	9.90	1.88
Floater processor	610	148.8mm	65.24	25.90	8.68
Shoreside processor	457	157.1mm	79.64	20.35	-0-
Totals	5,195	151.5mm	84.69	12.70	2.52

Table 43. Adak commercially retained red king crab length frequencies from the 1990 and 1992 fisheries.

Length (mm)	1990 num. of crab	1990 % sample	1992 num. of crab	1992 % sample
131 - 135	256	2.9	39	3.8
136 - 140	1,299	14.5	170	16.7
141 - 145	1,765	19.8	183	18.0
146 - 150	1,615	18.1	163	16.1
151 - 155	1,362	15.3	166	16.4
156 - 160	1,099	12.3	109	10.7
161 - 165	753	8.5	95	9.4
166 - 170	431	4.8	48	4.7
171 - 175	225	2.5	25	2.5
176 - 180	106	1.2	16	1.6
Totals	8,911[a] mean size = 141.9mm	99.9[b]	1,014 mean size = 150.3mm	99.9

[a] Total sample numbers do not include length frequencies outside the listed ranges.

[b] Percentages do not include length frequencies outside the listed range.

Table 44. Illegally retained crab observed in the 1992 Adak red king crab fishery by sample type including undersized males, females and other crabs.

Sample type	Sample size	Undersized males No./ % sample		Females No./ % sample		Number of other crab	Total % illegals	Total crabs harvested	Est. total[a] illegals	% Harvest sampled
Catcher[b] Processor	24,187	194	.8	0	0	1	.8	80,713	646	30.0
Floater[c] Processor	3,087	15	.5	0	0	0	.5	48,819	244	6.3
Totals	27,284	209	.7	0	0	1	.7	129,532	890	21.1

[a] Estimates derived from percentage of illegal crab X total numbers of crab harvested during the fishery.
[b] Catcher processor figures based upon legal measurements of 600 retained crab on each vessel per fishing day.
[c] Floater processor figures based upon legal measurements of 600 retained crab per each catcher vessel delivery.

Table 45. Shell age distributions of males and females observed during the 1990, 1991, and 1992 Adak red king crab fisheries.

Fishery year	Sample size[a]	Shell age classes					
		New	% total	Skip molt	% total	2nd skip	% total
1990							
Males	2,240	2,024	90.4	212	9.5	4	.1
Females	501	497	99.2	4	.8	0	-
1991							
Males	2,602	2,315	89.0	266	10.2	21	.8
Females	685	665	97.1	20	3.9	0	-
1992							
Males	2,336	2,086	89.3	235	10.1	90	.6
Females	1,377	1,371	99.6	6	.4	0	-

[a] Derived from random pot contents samples taken on catcher processors during the fisheries.

Table 46. Reproductive state of female red king crabs observed in pot samples from the 1990, 1991, and 1992 Adak fisheries.

Fishery year	No. females eyed eggs	% of total	No. females uneyed eggs	% of total	No. females mated/barren	% of total	No. females non-mated	% of total
1990								
167 pots								
519 crab	317	61.1	66	20.8	12	3.8	124	23.9
1991								
116 pots								
584 crab	193	33.0	368	63.1	7	1.2	16	2.7
1992								
123 pots								
1,378 crab	1,141	82.8	212	15.4	6	.4	19	1.4
Total	1,651	66.5	646	26.0	25	1.0	159	6.4
2,481 crab								

Table 47. 1992 Bering Sea commercially retained *C. bairdi* width frequency statistics by processor type.

Sample type	Sample size	Ave. width	--- Shell age percentages --- New / Skip molt / 2nd skip		
Catcher processor	53,949	147.9mm	87.70	11.32	.94
Floater processor	49,165	147.8mm	94.81	5.00	.17
Shoreside processor	22,075	148.8mm	87.75	11.89	.35
Totals	208,592	112.2mm	96.25	3.62	0.13

Table 48. Bering Sea commercially retained *C. bairdi* crab width frequencies from the 1991 and 1992 fisheries.

Width (mm)	1991 num. of crab	1991 % sample	1992 num. of crab	1992 % sample
131 - 135	723	0.6	577	0.5
136 - 140	13,281	10.6	16,887	13.5
141 - 145	29,846	23.9	35,110	28.0
146 - 150	26,226	21.0	30,799	24.6
151 - 155	20,401	16.3	21,999	17.6
156 - 160	14,997	12.0	12,063	9.6
161 - 165	9,775	7.8	5,001	4.0
166 - 170	5,520	4.4	1,662	1.3
171 - 175	2,522	2.0	510	0.4
176 - 180	804	0.6	166	0.1
Totals	124,095[a] mean size = 150.4mm	99.2[b]	124,774 mean size = 148.0mm	99.6

[a] Total sample numbers do not include length frequencies outside the listed ranges.

[b] Percentages do not include length frequencies outside the listed range.

Table 49. Illegally retained crab observed in the 1992 Bering Sea *C. bairdi* fishery by sample type including undersized males, females and other crabs.

Sample type	Sample size	Undersized males No./ % sample		Females No./ % sample		Number of other crab	Total % illegals	Total crabs harvested	Est. total[a] illegals	% Harvest sampled
Catcher[b] Processor	290,102	2,235	.8	72	<.1	72	.8	1,918,408	15,347	15.1
Floater[c] Processor	232,616	3,280	1.4	124	<.1	6	1.4	5,336,289	74,708	4.4
Totals	522,718	5,515	1.1	196	<.1	78	1.2	7,254,697	79,801	7.2

[a] Estimates derived from percentage of illegal crab X total numbers of crab harvested during the fishery.
[b] Catcher processor figures based upon legal measurements of 600 retained crab on each vessel per fishing day.
[c] Floater processor figures based upon legal measurements of 600 retained crab per each catcher vessel delivery.

Table 50. Catch per pot of commercially important species from the 1992 Bering Sea *C. bairdi* crab fishery between November 15th to December 31st, 1992.

Species	Total pot[a] sample catch	Catch per unit effort	Estimated total[b] fishery catch
C. bairdi			
legal male	15,365	29.7	14,629,181
sub-legal male	21,917	42.3	20,835,500
female	5,354	10.4	5,122,676
C. opilio			
legal male	2,754	5.3	2,610,595
sub-legal male	86	.2	98,513
female	66	.1	49,257
hybrid Tanner crab			
mixed size/sex	946	1.8	886,617
red king crab			
legal male	101	.2	98,513
sub-legal male	309	.6	295,539
female	1,115	2.2	1,083,643
blue king crab			
legal male	6	<.1	5,716
sub-legal male	28	<.1	26,677
female	48	.1	49,257
yellowfin sole	147	.3	147,770
halibut	23	<.1	21,913
pacific cod	754	1.5	738,848

[a] Total pot contents derived from 517 random samples taken on catcher processors between November 15th and December 31st, 1992.

[b] Estimated catch derived from pot sample CPUE x 492,565 total reported pot pulls between November 15th and December 31st, 1992.

Table 51. Shell age distributions of males and females observed in the 1990, 1991, and 1992 Bering Sea *C. bairdi* crab fisheries.

Fishery year	Sample size[a]	Shell age classes					
		New	% total	Skip molt	% total	2nd skip	% total
1990							
Males	41,265[b]	34,536	83.7	6,070	14.7	654	1.6
Females	4,436	1,658	37.4	2,263	51.0	515	11.6
1991							
Males	31,253	27,818	89.0	3,162	10.1	273	.9
Females	5,639	2,515	44.6	2,507	44.5	617	10.9
1992							
Males	36,943[c]	30,991	83.8	5,411	14.6	491	1.3
Females	5,162	475	9.2	3,643	70.6	1,044	20.2

[a] Derived from random pot contents samples taken on catcher processors during the fisheries.
[b] Includes six crab recorded as soft shell.
[c] Includes fifty crab recorded as soft shell.

Table 52. Reproductive state of *C. bairdi* females observed in pot samples from the 1990, 1991, and 1992 Bering Sea *C. bairdi* fisheries.

Fishery year	No. females eyed eggs	% of total	No. females uneyed eggs	% of total	No. females mated/barren	% of total	No. females non-mated	% of total
1990								
923 pots								
4,306 crab	2,297	53.3	1,936	45.0	47	1.1	26	.1
1991								
533 pots								
5,644 crab	1,274	22.6	4,205	74.5	118	2.1	47	.8
1992								
543 pots								
5,139 crab	440	8.6	4,447	86.5	196	3.8	56	1.1
Total	4,011	26.5	10,588	70.2	361	2.4	129	.9
15,089 crab								

Table 53. Lost pot statistics from selected 1992 and 1993 Bering Sea/Aleutian Islands fisheries.

Fishery	Number of[a] vessels surveyed	Pots fished total	Pots fished / avg.	Pots pulled total	Pots pulled / avg.	Fishing days total	Fishing days / avg.	Pots lost[b] total	Pots lost[b] / avg.	Est. total pots lost[c] CP's	Est. total pots lost[c] / All vessels
1992 Bristol Bay red king	11	2,750	250	11,358	1,033	66	6	32	2.9	45	815
1992 Bering Sea *C. bairdi*	11	2,800	254	43,209	3,928	331	30	179	16.2	356	4,617
1992 Adak brown king	4	2,700	675	48,808	12,202	244	41	47	12.0	47	192
1993 Bering Sea *C. opilio*	20	6,524	285	98,612	4,287	1,054	42	436	17.0	390	4,318
Totals	49[d]	14,504	296	201,987	4,122	1,695	35	694	14.2	838	9,992

[a] Includes only catcher processors carrying shellfish observers during survey periods.
[b] Based on records maintained by shellfish observers deployed on each vessel surveyed.
[c] Estimated pots lost by entire fleet during season(s). Derived from: (avg. pots lost/vessel divided by avg. pot pulls/vessel) X reported number of pot pulls during the fishery(s).
[d] Some vessels surveyed repeatedly from consecutive participation in separate fisheries.

Table 54. Commercial shellfish pot biodegradable escape mechanism survey statistics.

Fishery	Number of[a] vessels surveyed	Pots[b] pulled	Days fished	Pots examined for B.E.M.[c] Total # / % of pots pulled		Pots containing B.E.M. Total # / % of pots examined	
1992 D. Harbor brown king	4	17,680	164	300	1.7	300	100.0
1992 St. Matt. blue king	8	7,586	20	290	3.8	289	99.6
1992 Bristol Bay red king	16	19,093	112	997	5.2	925	92.8
1992 Bering Sea C. bairdi	19	57,208	596	4,784	8.4	4,647	97.1
1992 Adak brown king	5	48,808	277	2,678	5.5	2,585	96.5
Totals	52	150,375	1,169	9,049	6.1	8,746	96.7

[a] Vessels surveyed include only catcher processors.

[b] Total number of pot pulls reported by surveyed vessels during each fishery.

[c] Surveys conducted by shellfish observers deployed on catcher processors during the fisheries. Surveys consisted of random inspections of ten pots per fishing day on each vessel. Pots were examined for the presence or absence of biodegradable escape mechanisms defined according to State of Alaska Commercial Shellfish Regulations.

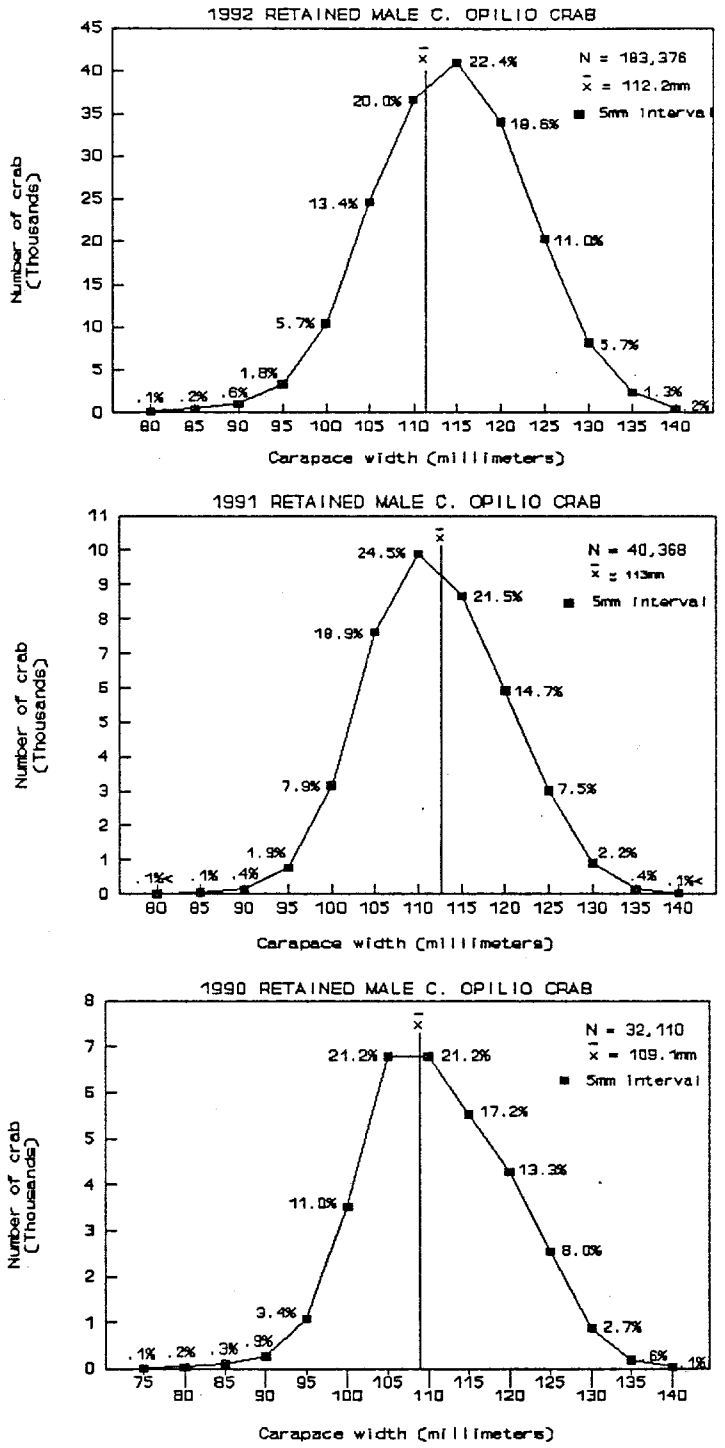


Figure 1 Commercially retained *C. opilio* width frequency statistics from the 1990, 1991, and 1992 Bering Sea fisheries.

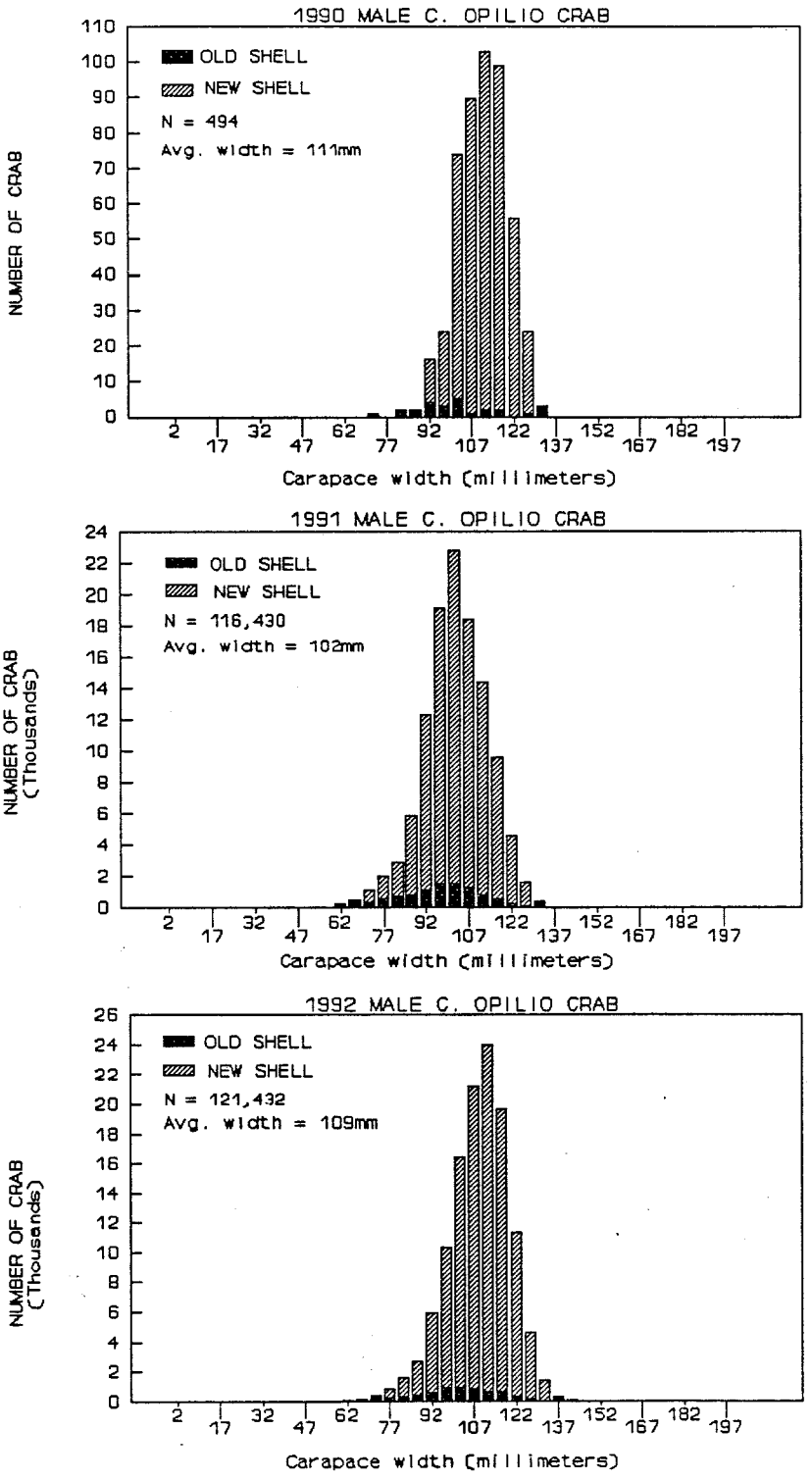


Figure 2 Width frequency distributions of all *C. opilio* males observed in pot content samples during the 1990, 1991, and 1992 Bering Sea *C. opilio* fisheries.

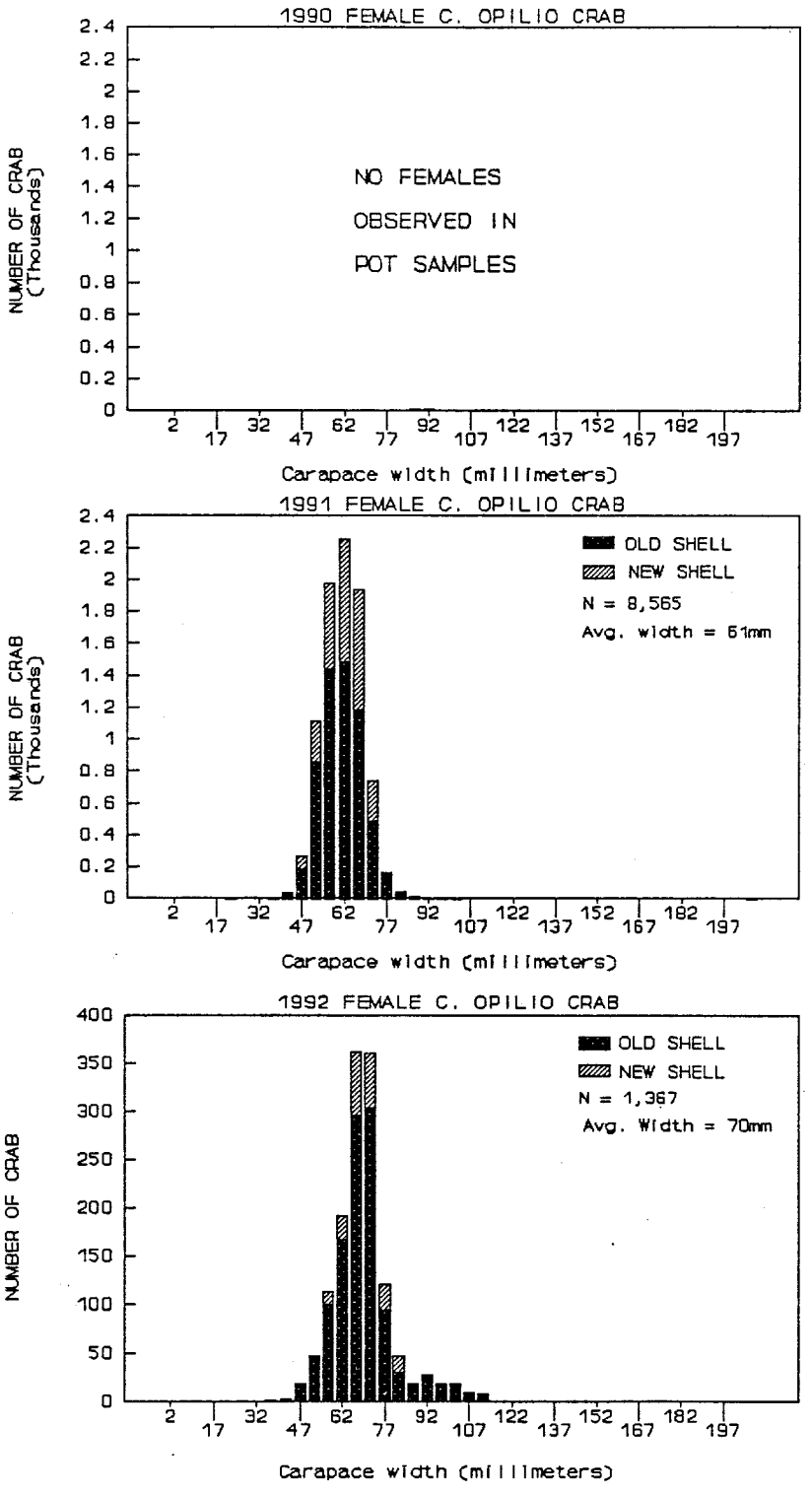


Figure 3 Width frequency distributions of female *C. opilio* observed in pot contents samples during the 1990, 1991, and 1992 Bering Sea *C. opilio* fisheries.

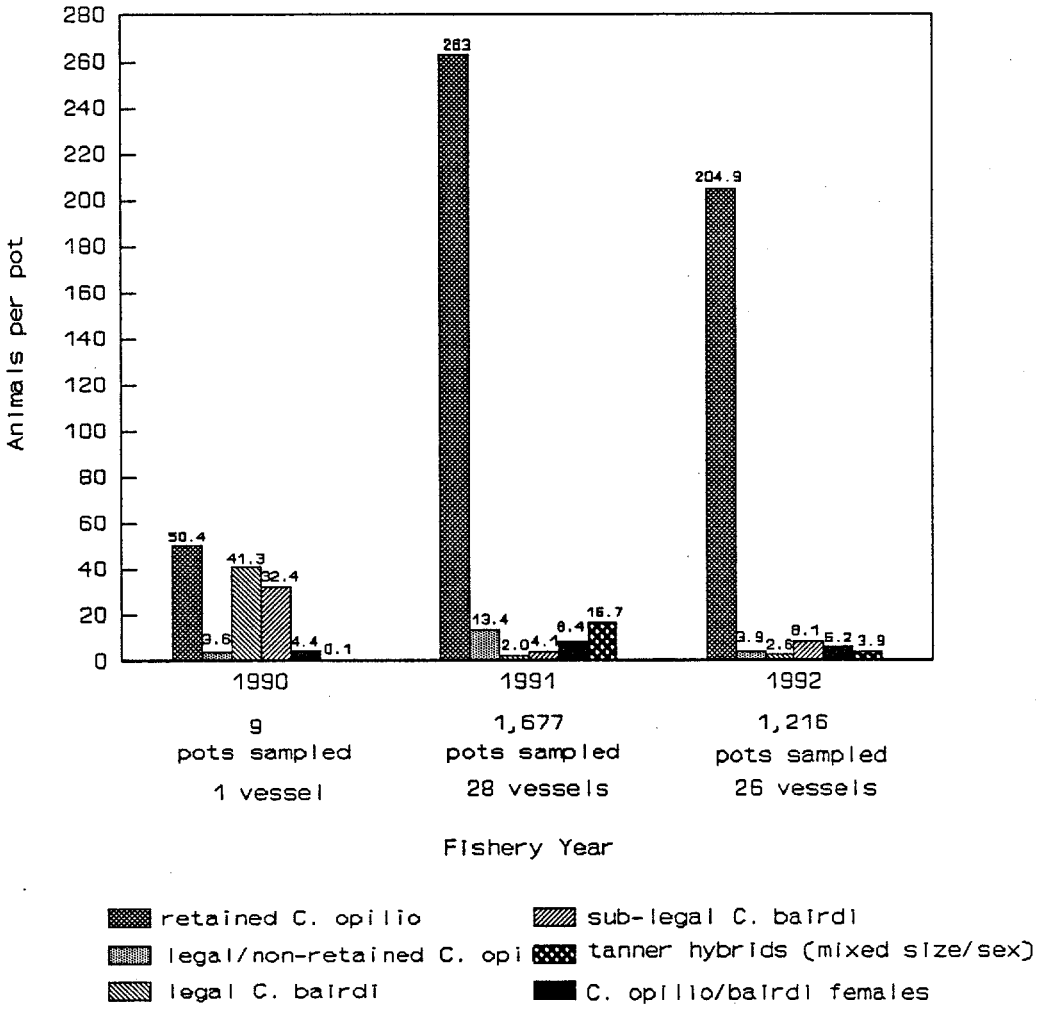


Figure 4 Catch per pot of *C. opilio*, *C. bairdi* and Tanner hybrid crab during the 1990, 1991, and 1992 Bering Sea *C. opilio* fisheries.

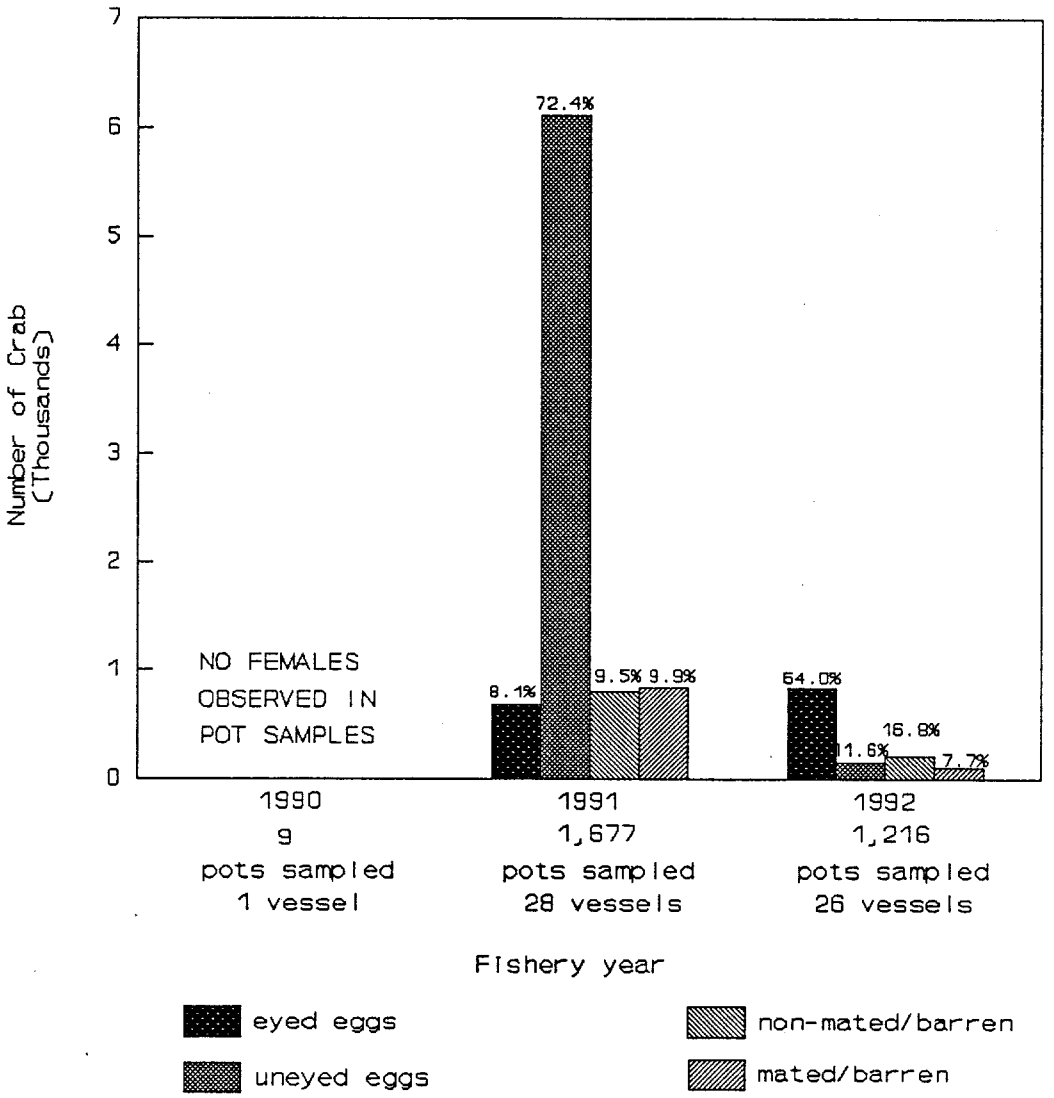


Figure 5 Reproductive states of female *C. opilio* observed in pot content samples during the 1990, 1991, and 1992 Bering Sea *C. opilio* fisheries.

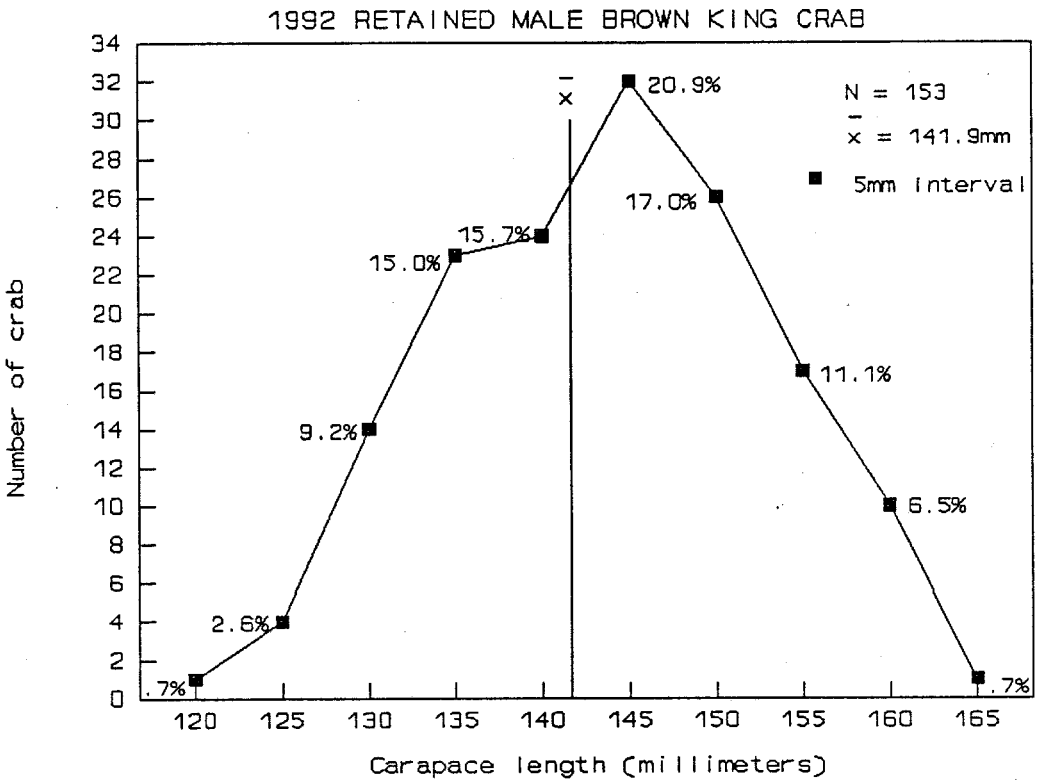


Figure 6 Commercially retained brown king crab length frequency statistics from the 1992 Bering Sea fishery.

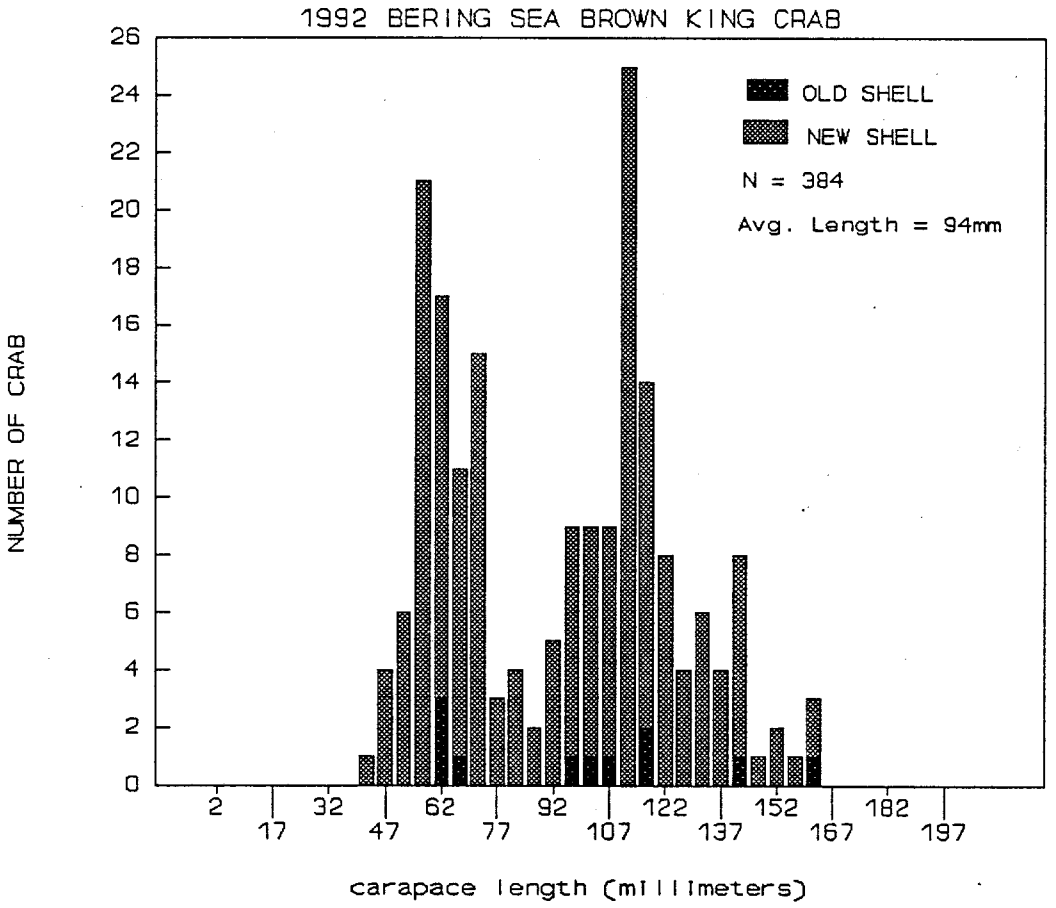


Figure 7 Length frequency distributions of all brown king crab males observed in pot content samples from the 1992 Bering Sea brown king crab fishery.

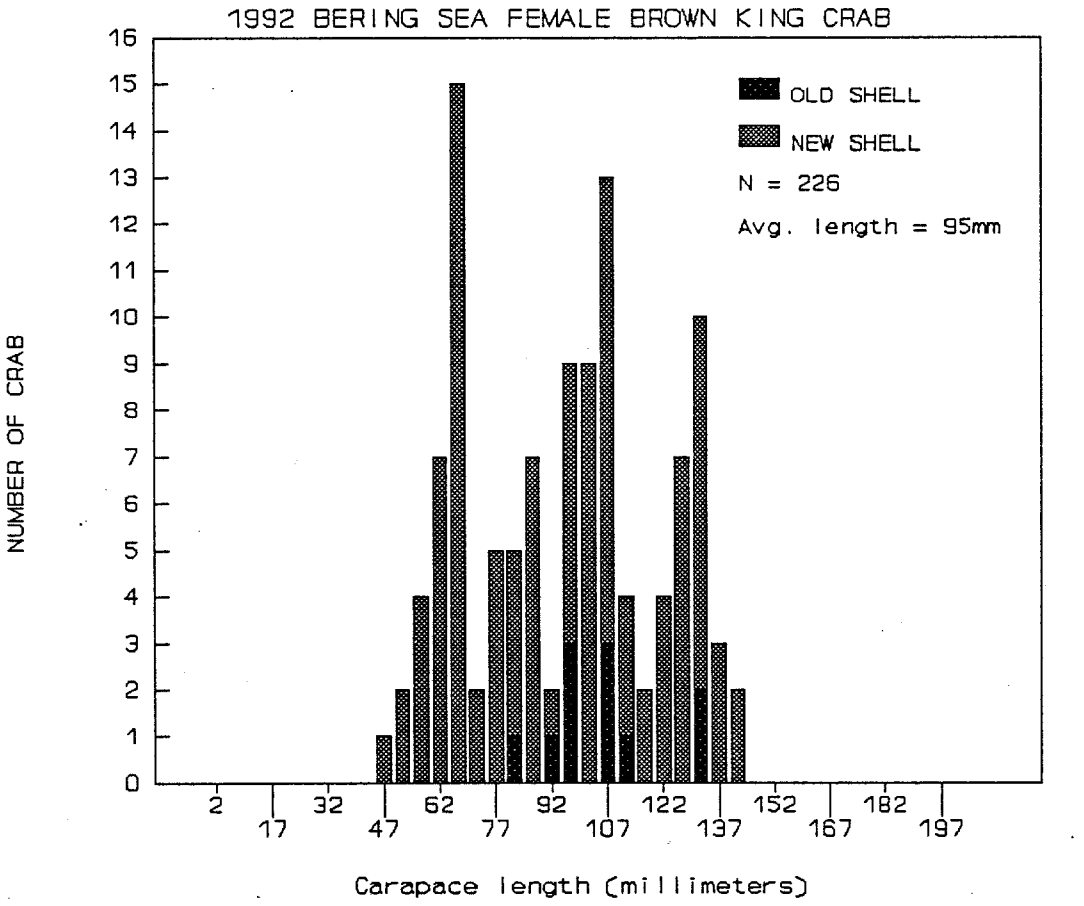


Figure 8 Length frequency distributions of brown king crab females observed in pot content samples from the 1992 Bering Sea brown king crab fishery.

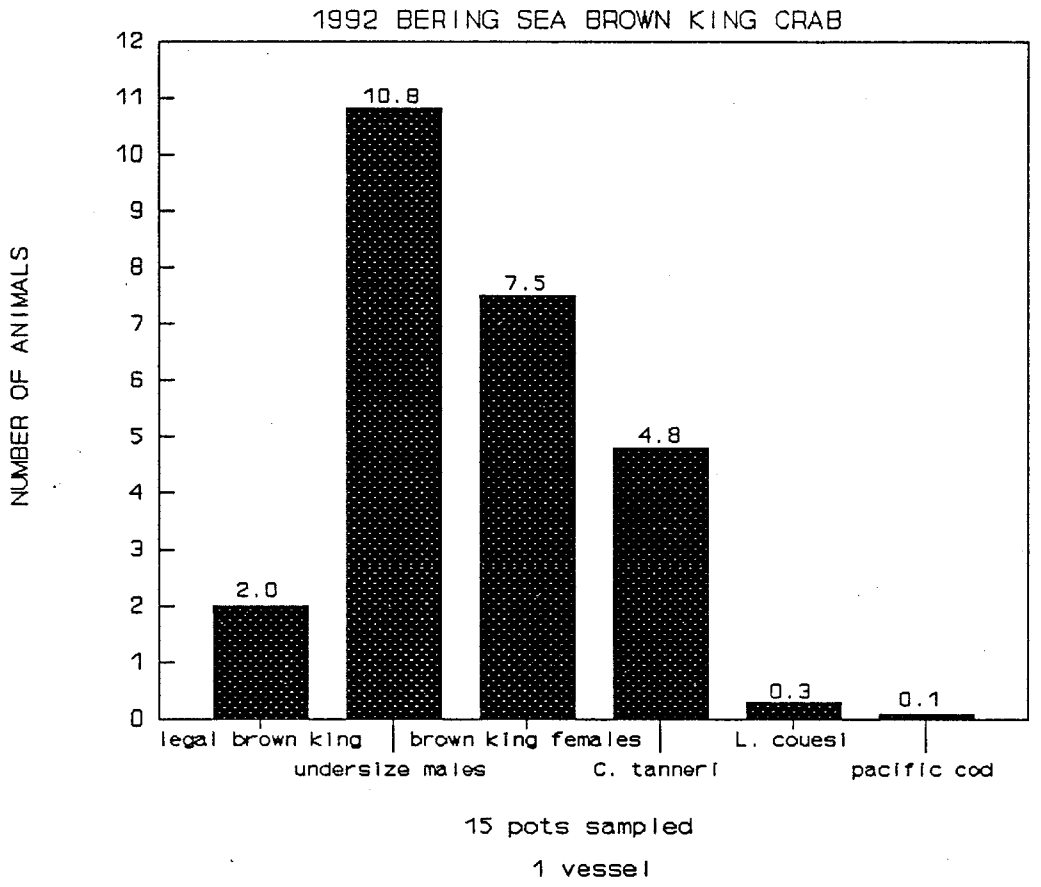


Figure 9 Catch per pot of commercially important species from the 1992 Bering Sea brown king crab fishery.

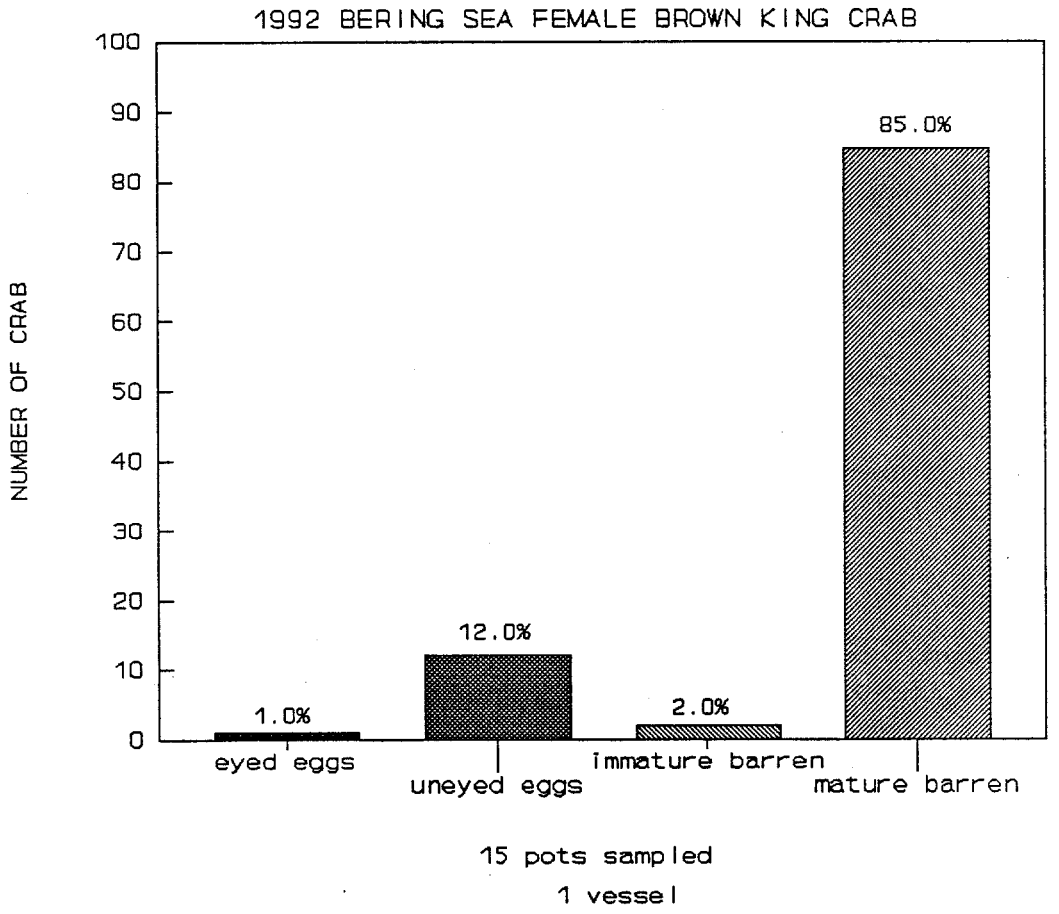


Figure 10 Reproductive states of female brown king crab observed in pot samples from the 1992 Bering Sea brown king crab fishery.

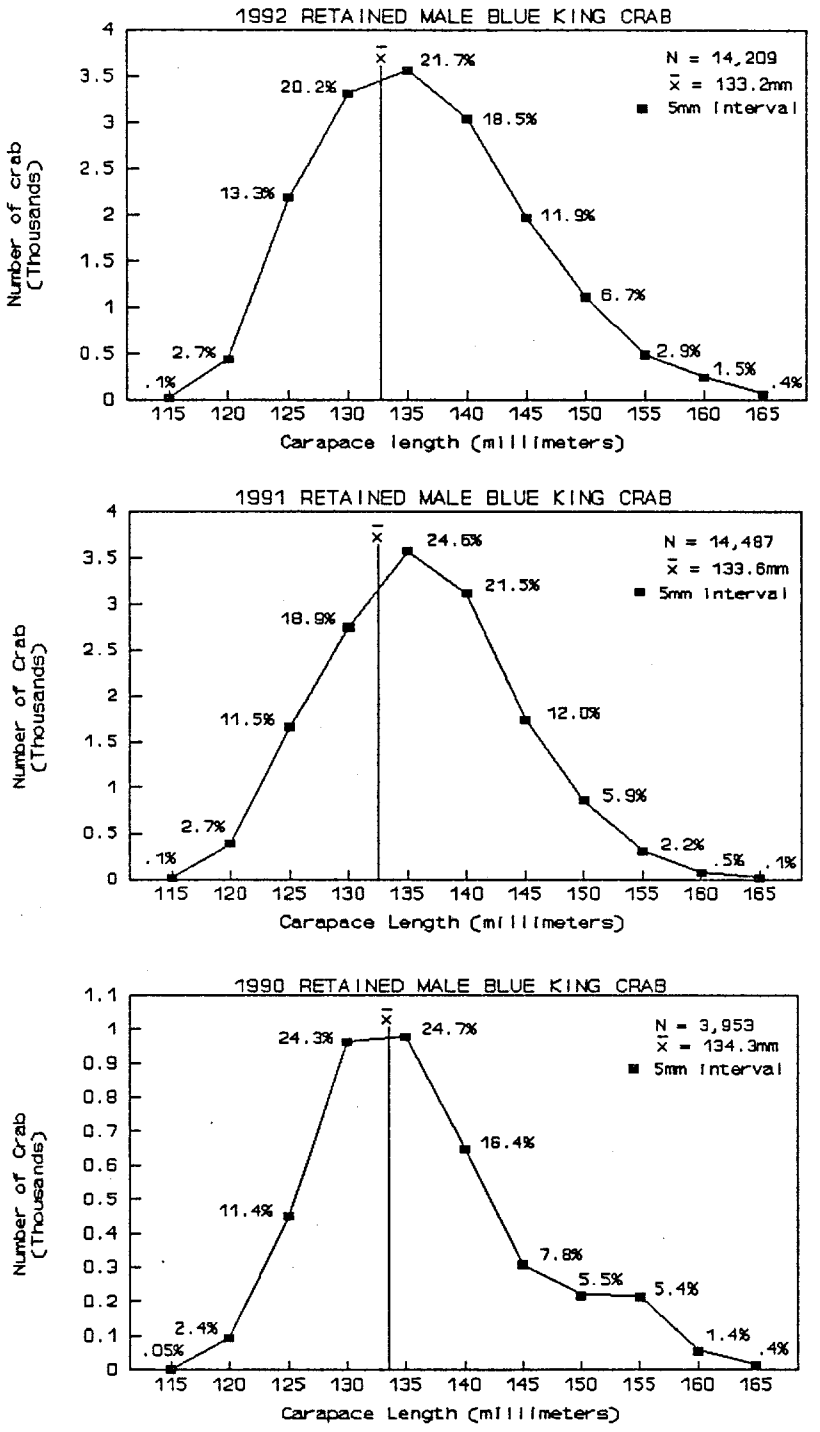


Figure 11 Commercially retained blue king crab length frequency statistics from the 1990, 1991, and 1992 St. Matthew fisheries.

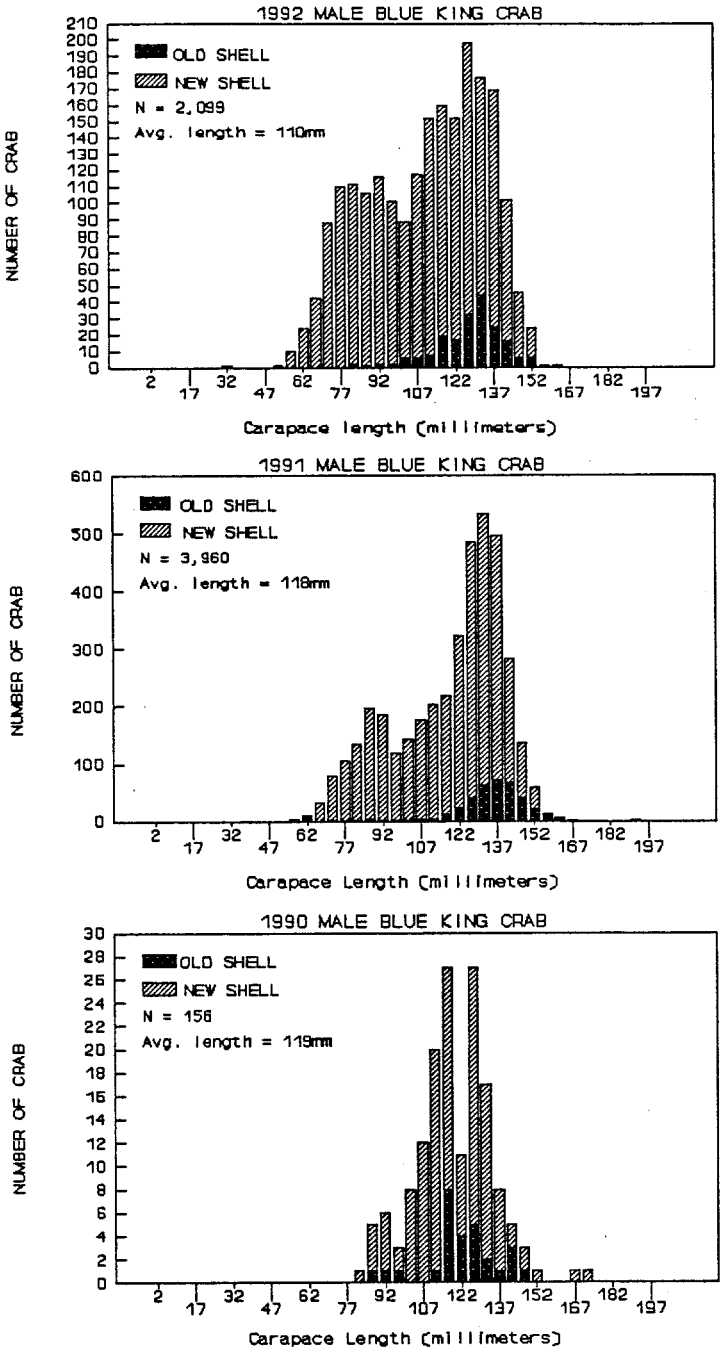


Figure 12 Length frequency distribution of all blue king crab males observed in pot samples from the 1990, 1991 and 1992 St. Matthew area blue king crab fisheries.

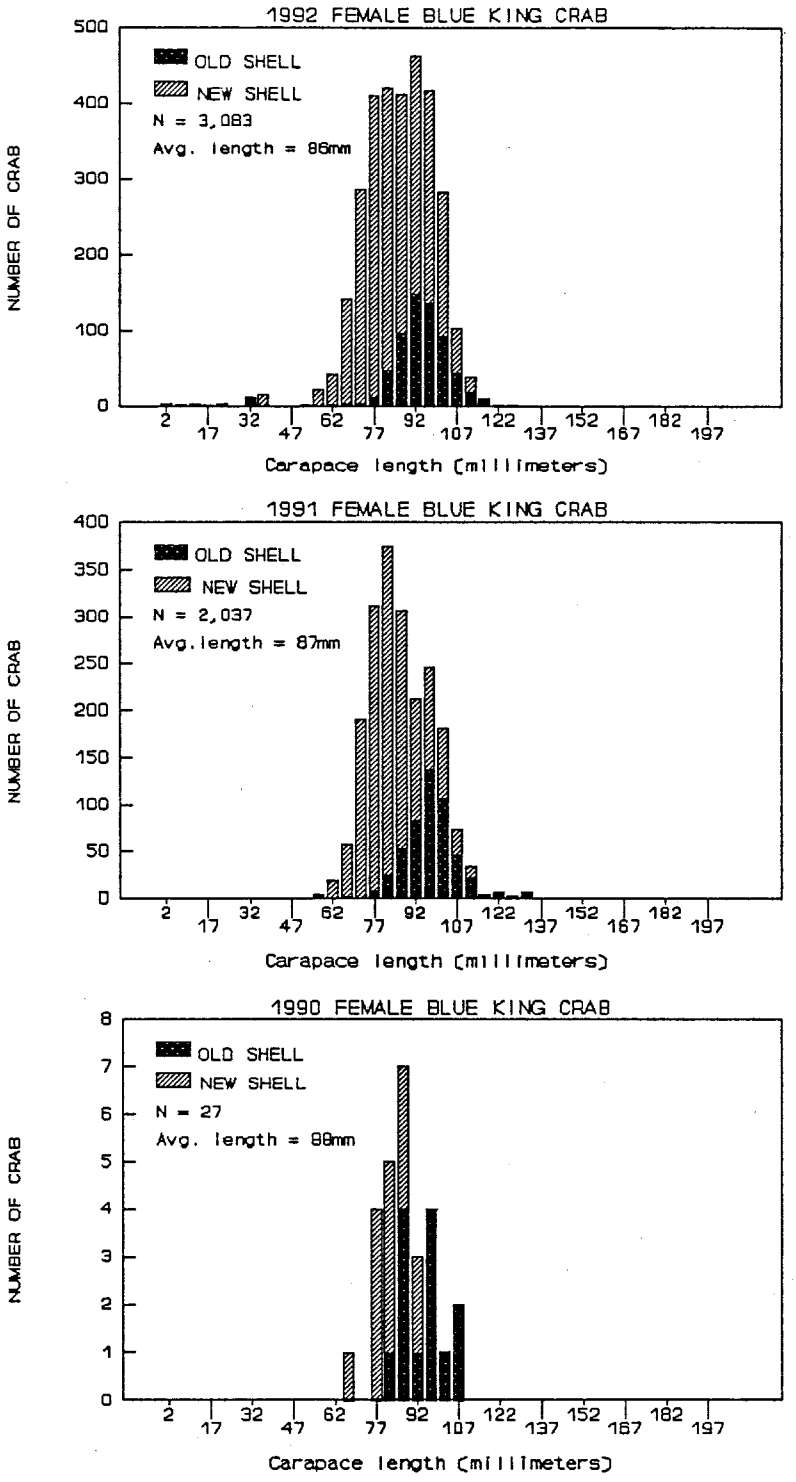


Figure 13 Length frequency distributions of female blue king crabs observed in pot samples from the 1990, 1991, and 1992 St. Matthew area blue king crab fisheries.

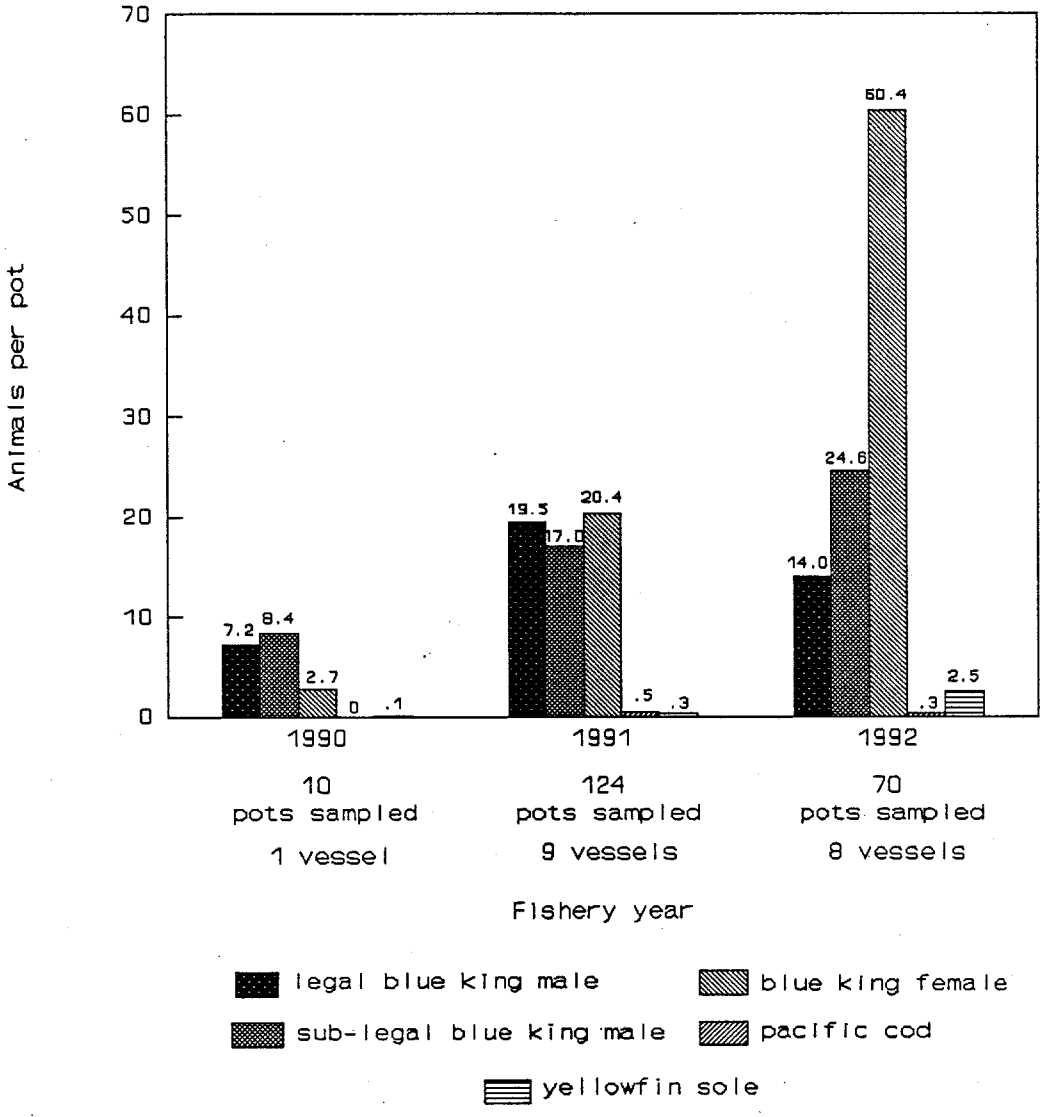


Figure 14 Catch per pot of commercially important species from the 1990, 1991, and 1992 St. Matthew area blue king crab fisheries.

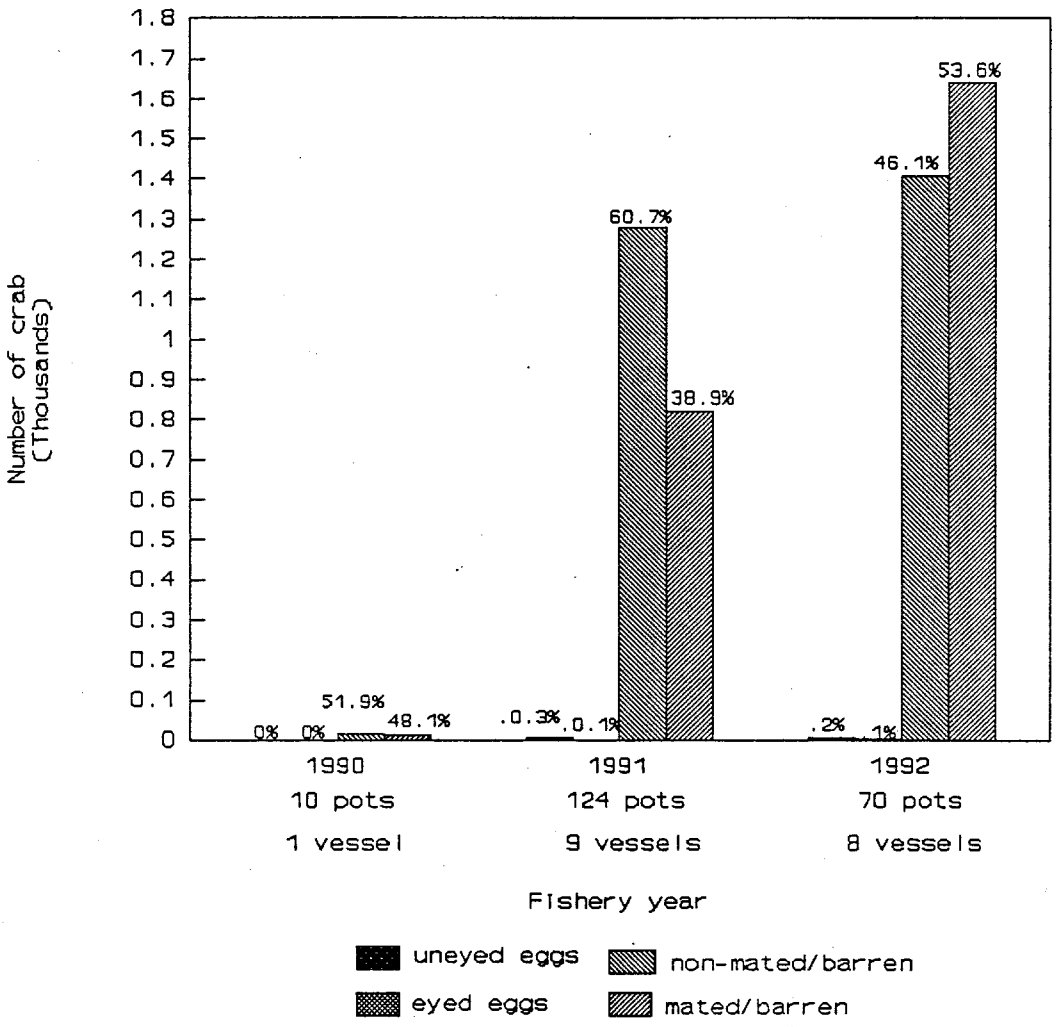
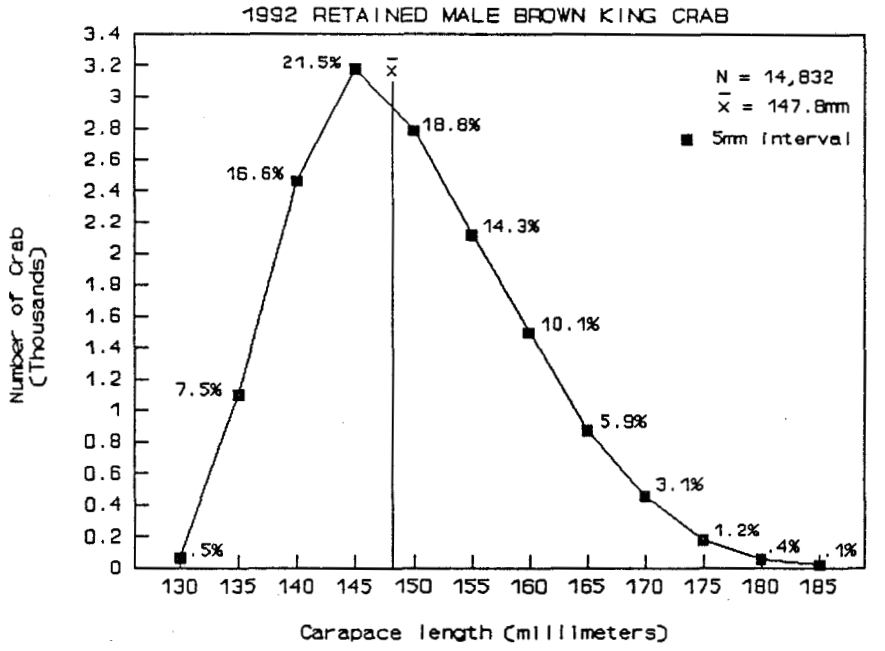


Figure 15 Reproductive states of female blue king crab observed in pot samples from the 1990, 1991, and 1992 St. Matthew area blue king crab fisheries.



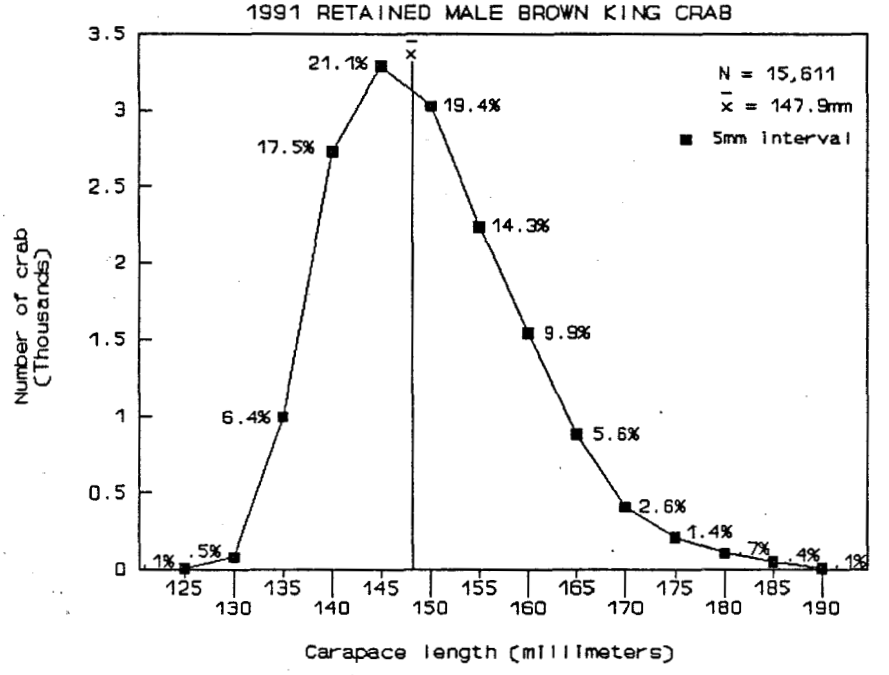


Figure 16 Commercially retained brown king crab length frequency distributions from 1991 and 1992 Dutch Harbor fisheries.

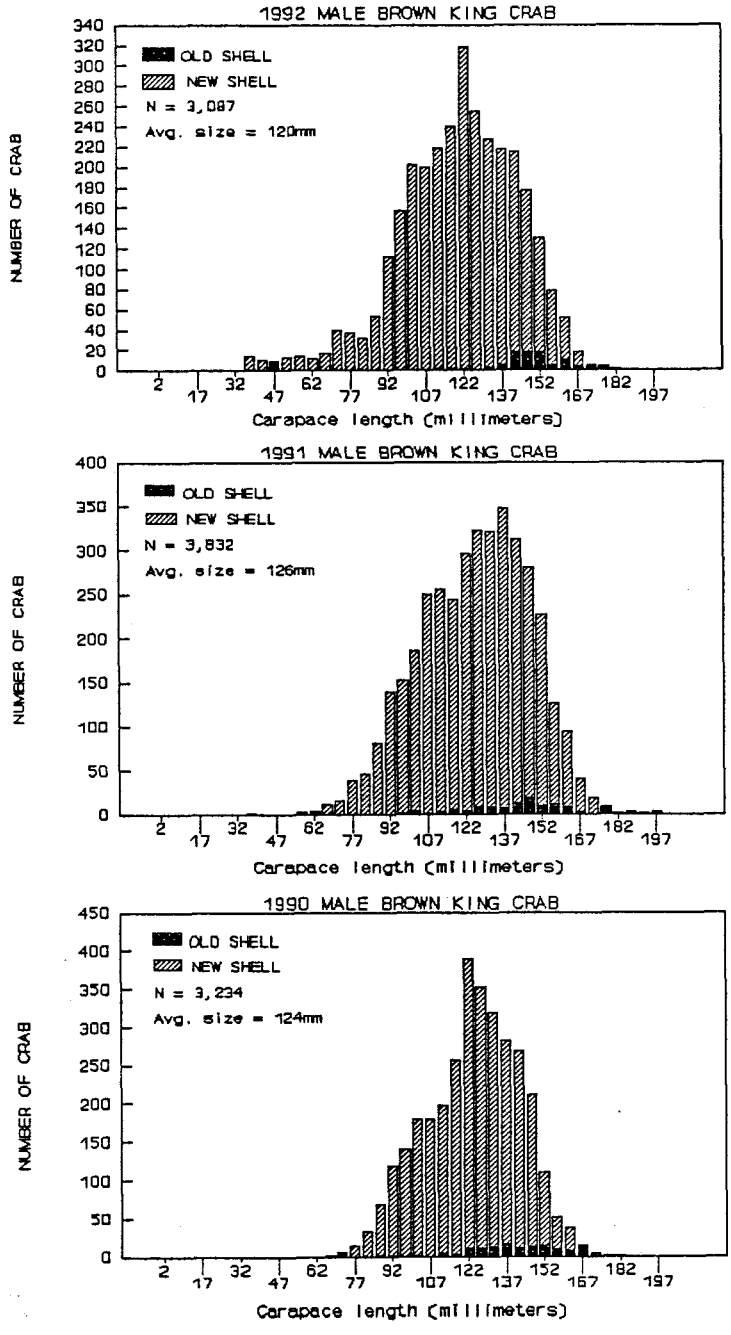


Figure 17 Length frequency distributions of all brown king crab males observed in pot samples from the 1990, 1991, and 1992 Dutch Harbor brown king crab fisheries.

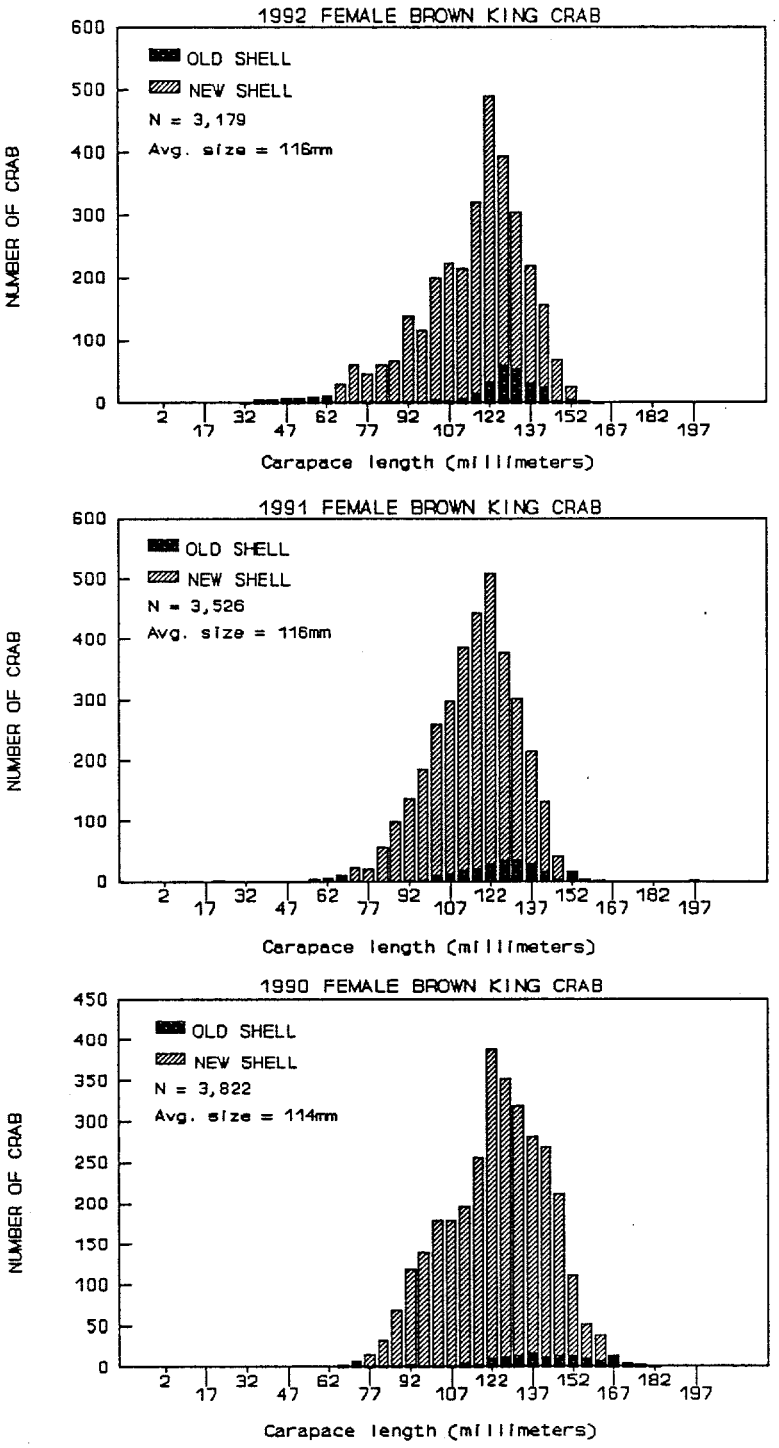


Figure 18 Length frequency distributions of female brown king crab observed in pot samples from the 1990, 1991, and 1992 Dutch Harbor brown king crab fisheries.

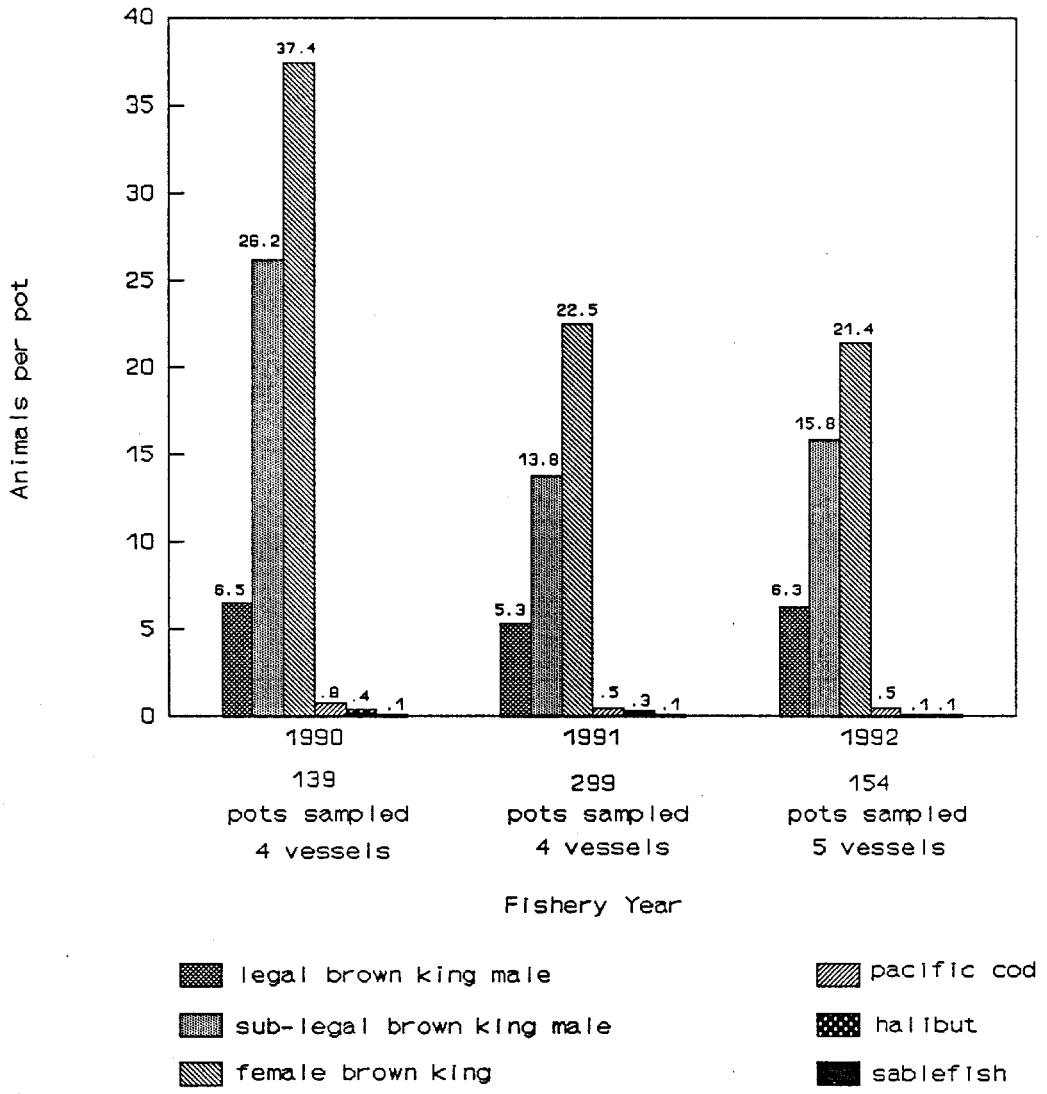


Figure 19 Catch per pot of commercially important species from the 1990, 1991, and 1992 Dutch Harbor brown king crab fisheries.

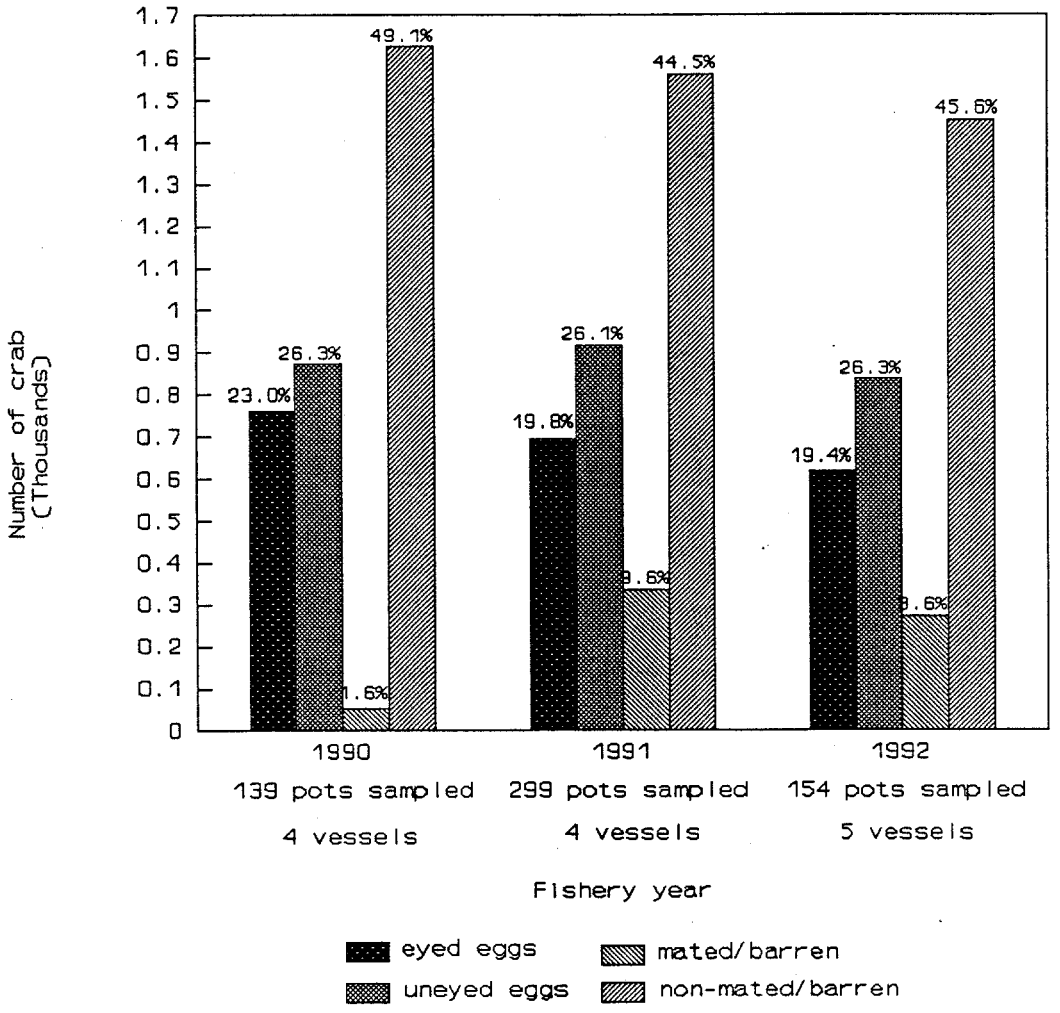


Figure 20 Reproductive states of female brown king crabs observed in pot samples from the 1990, 1991, and 1992 Dutch Harbor area brown king crab fisheries.

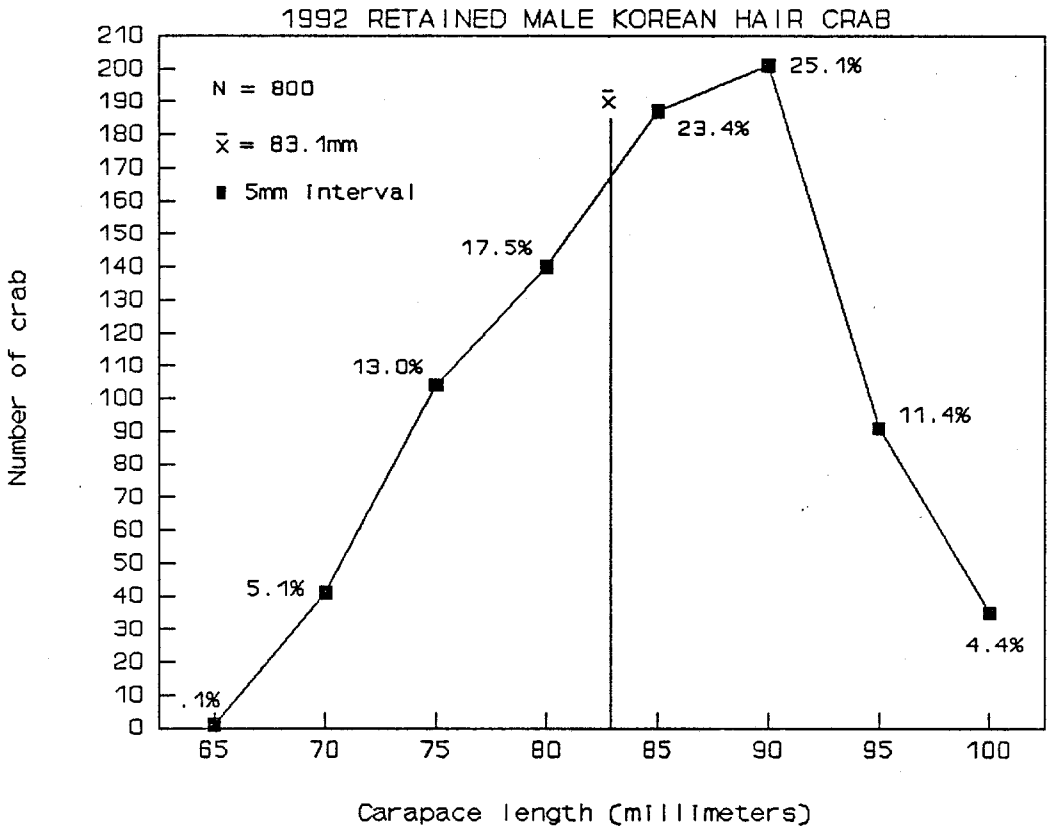


Figure 21 Commercially retained Korean hair crab length frequency statistics from the 1992 Bering Sea fishery.

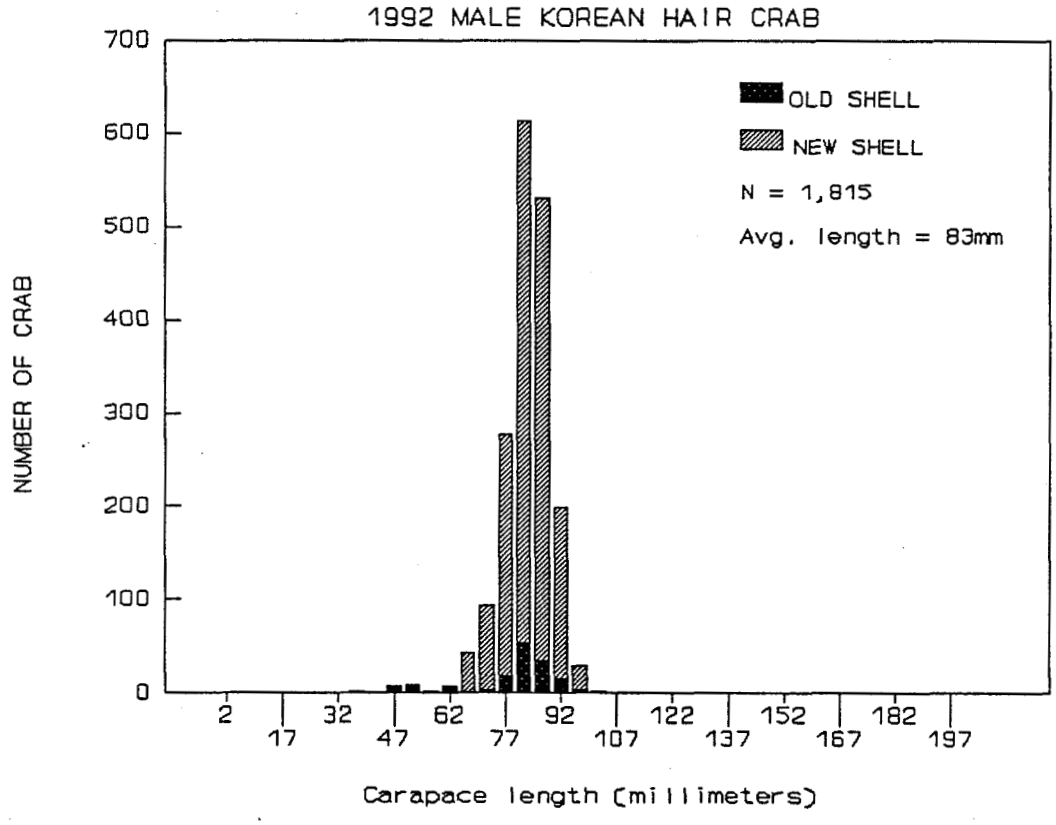


Figure 22. Length frequency distributions of all male Korean hair crab observed in pot samples from the 1992 Bering Sea Korean hair crab fishery.

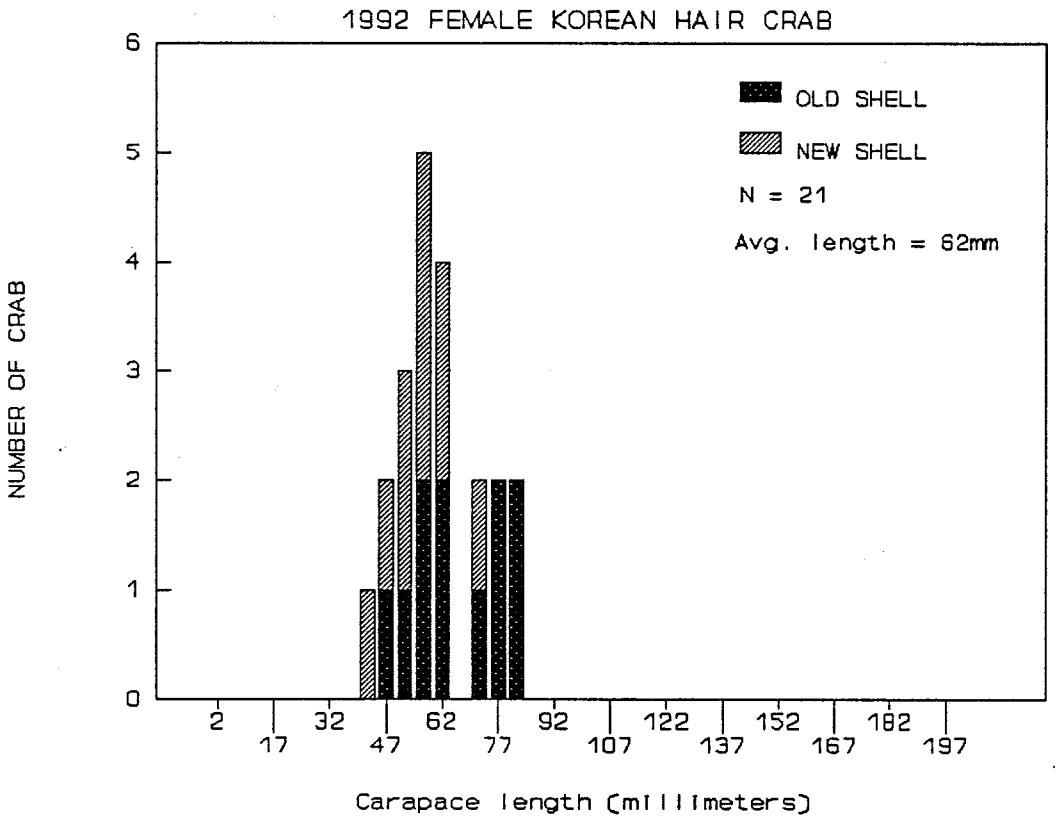


Figure 23 Length frequency distributions of female Korean hair crabs observed in pot samples from the 1992 Bering Sea Korean hair crab fishery.

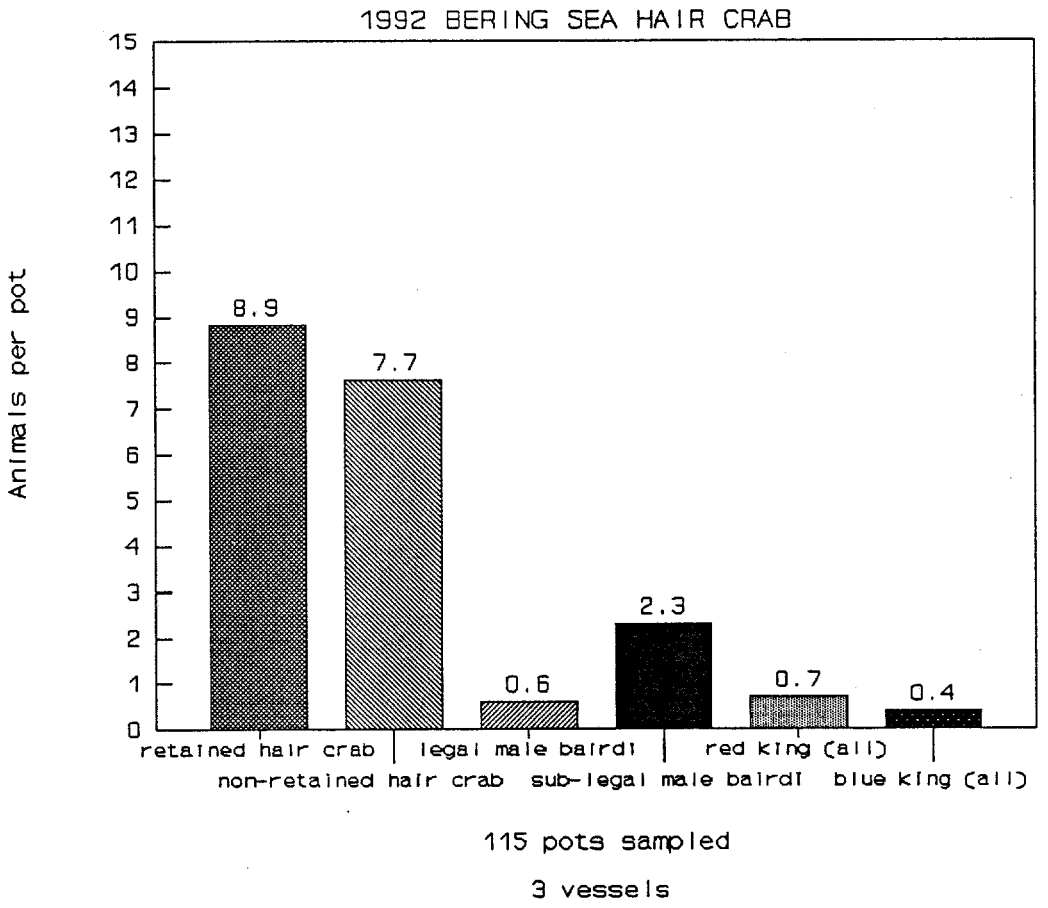


Figure 24 Catch per pot of commercially important species from the 1992 Bering Sea Korean hair crab fishery.

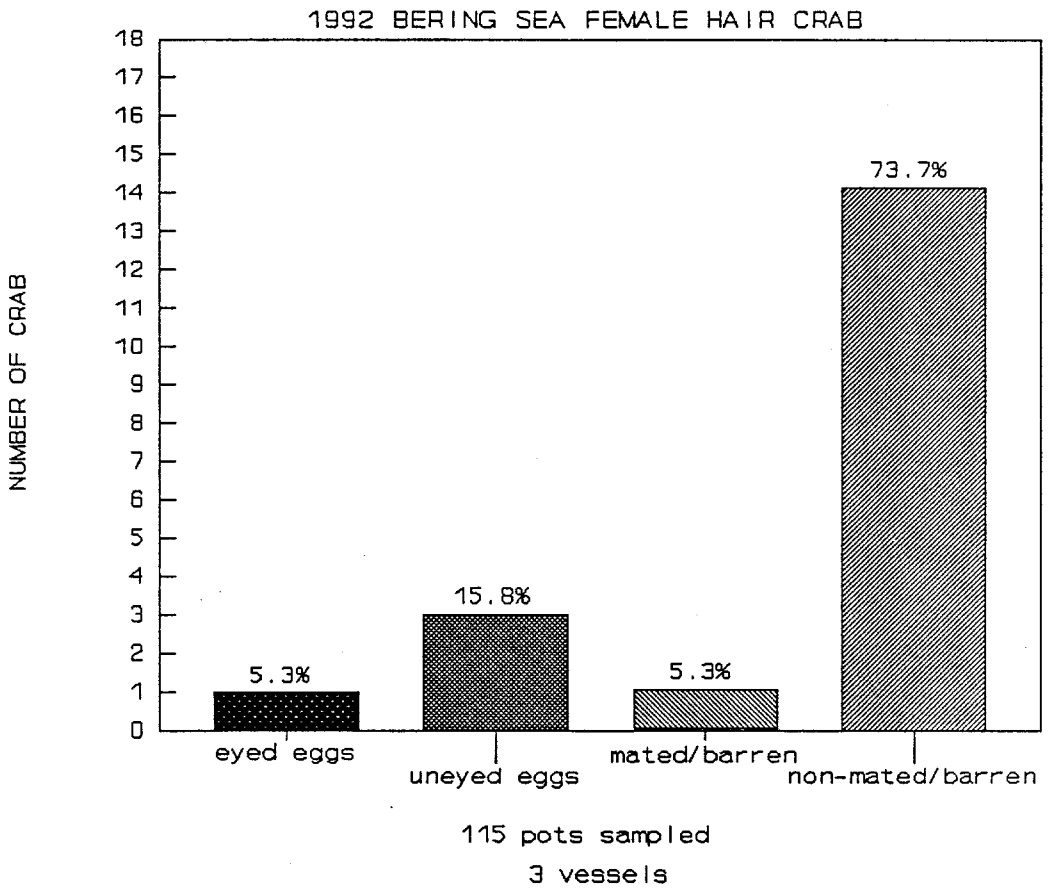


Figure 25 Reproductive states of female Korean hair crabs observed in pot samples from the 1992 Bering Sea Korean hair crab fishery.

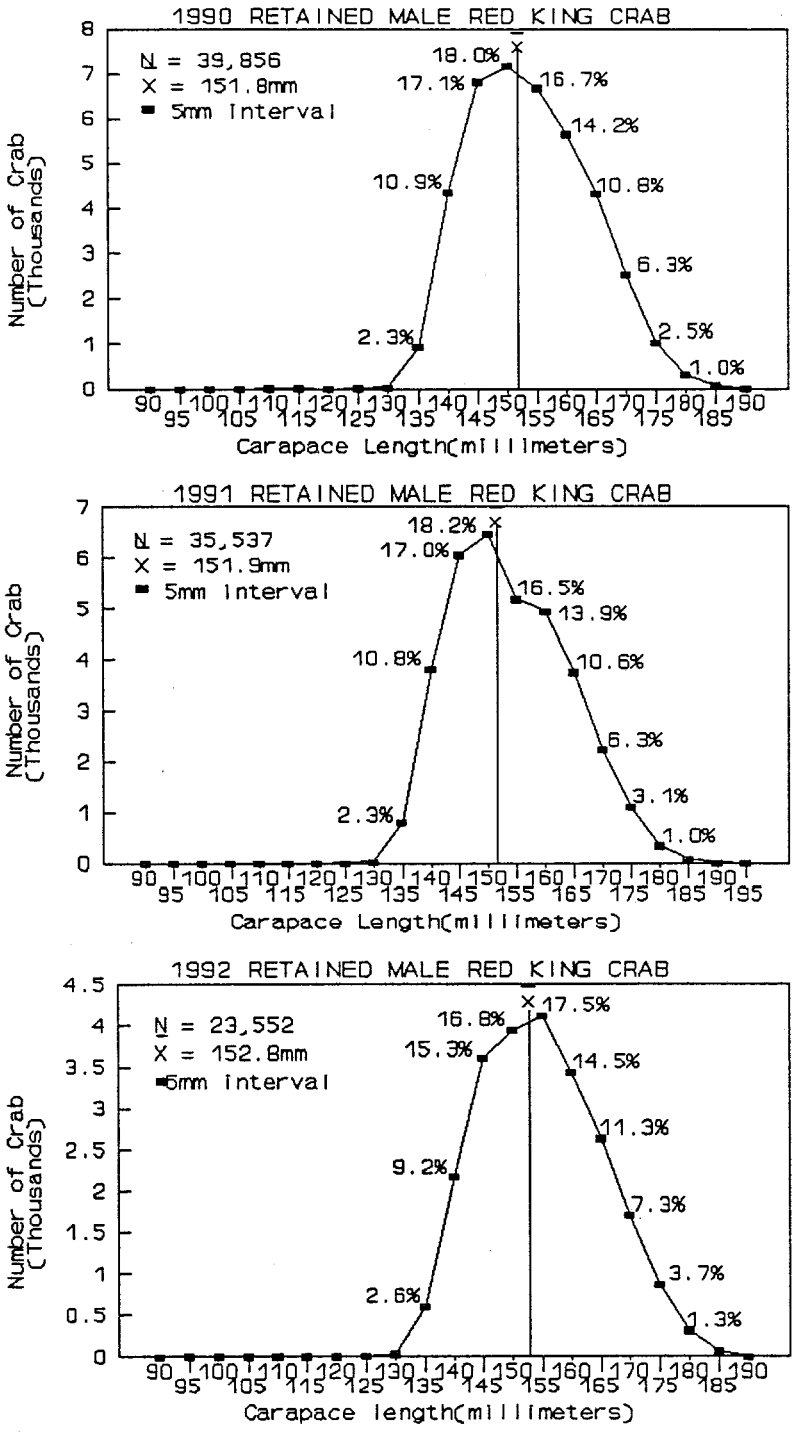


Figure 26 Commercially retained red king crab length frequency statistics from the 1990, 1991, and 1992 Bristol Bay fisheries.

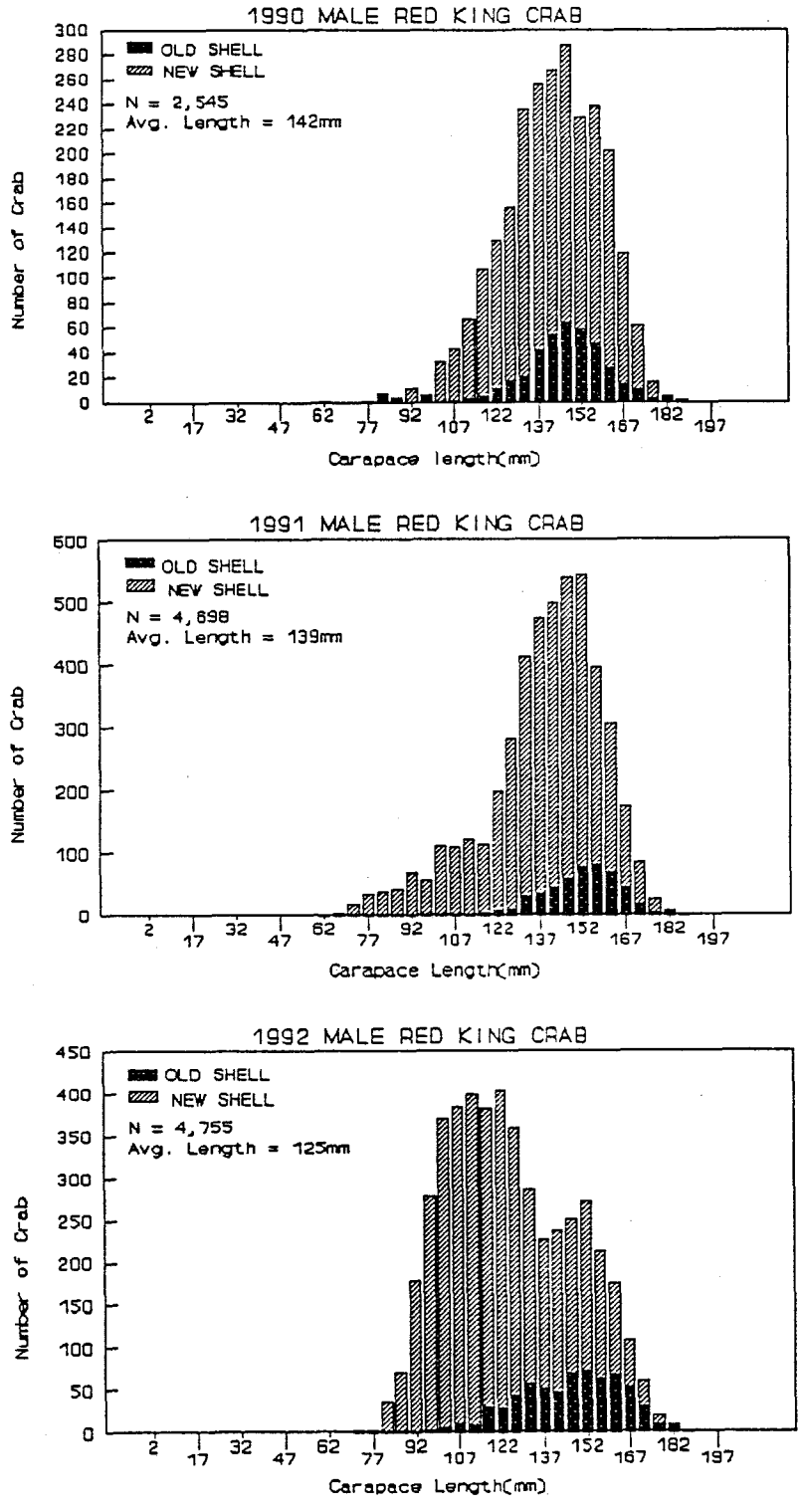


Figure 27 Length frequency distributions of all male red king crab observed in pot samples from the 1990, 1991, and 1992 Bristol Bay red king crab fisheries.

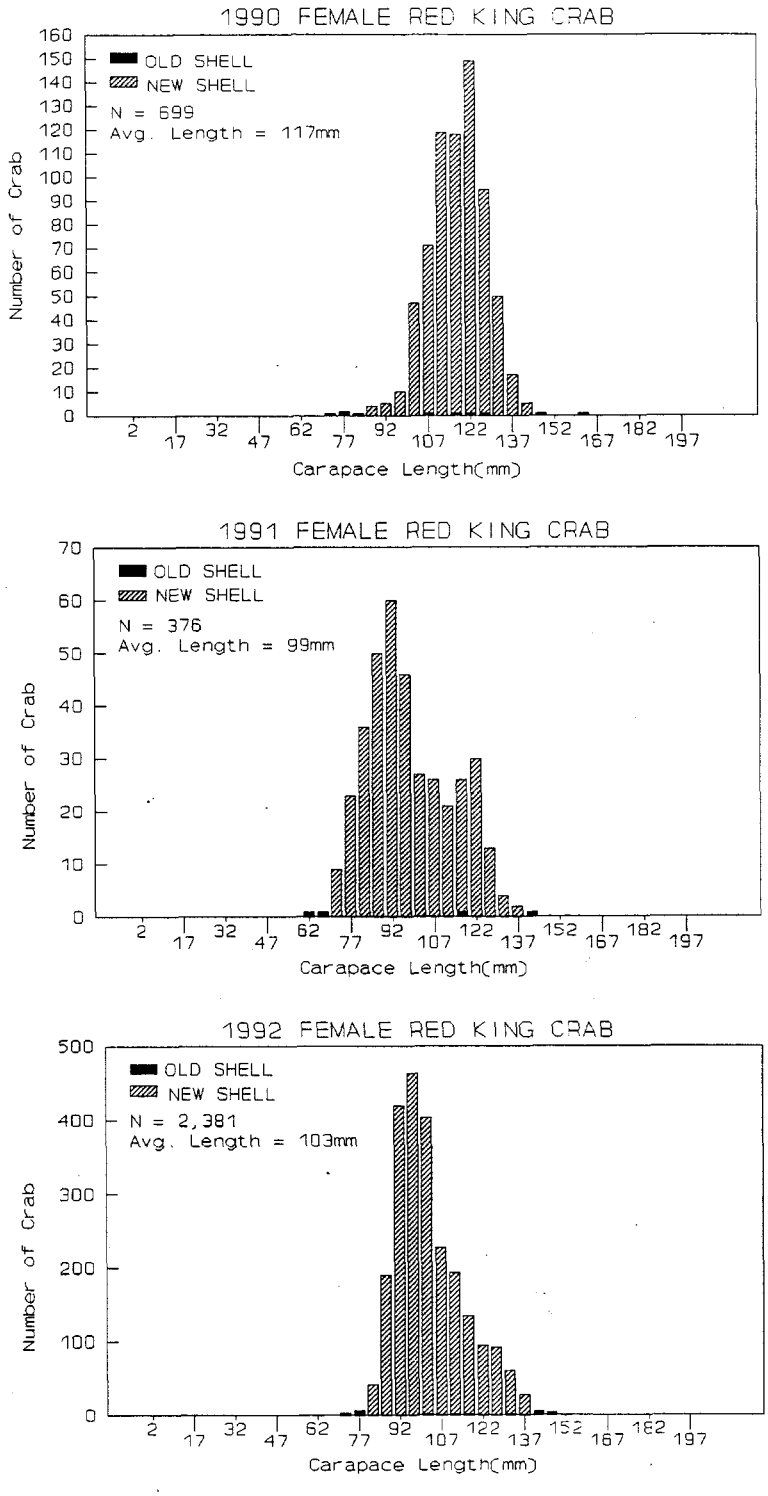


Figure 28 Length frequency distributions of female red king crabs observed in pot samples during the 1990, 1991, and 1992 Bristol Bay red king crab fisheries.

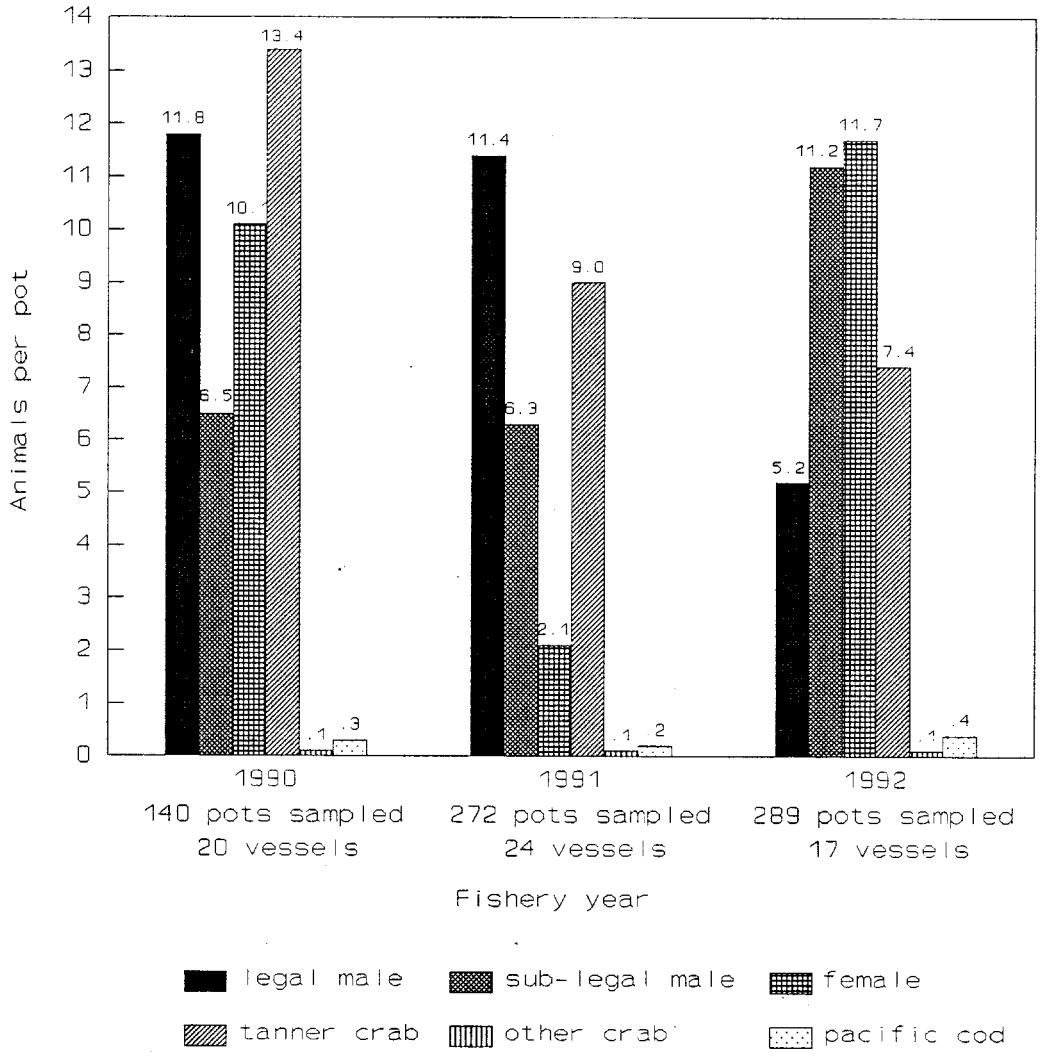


Figure 29 Catch per pot of commercially important species from the 1990, 1991, and 1992 Bristol Bay red king crab fisheries.

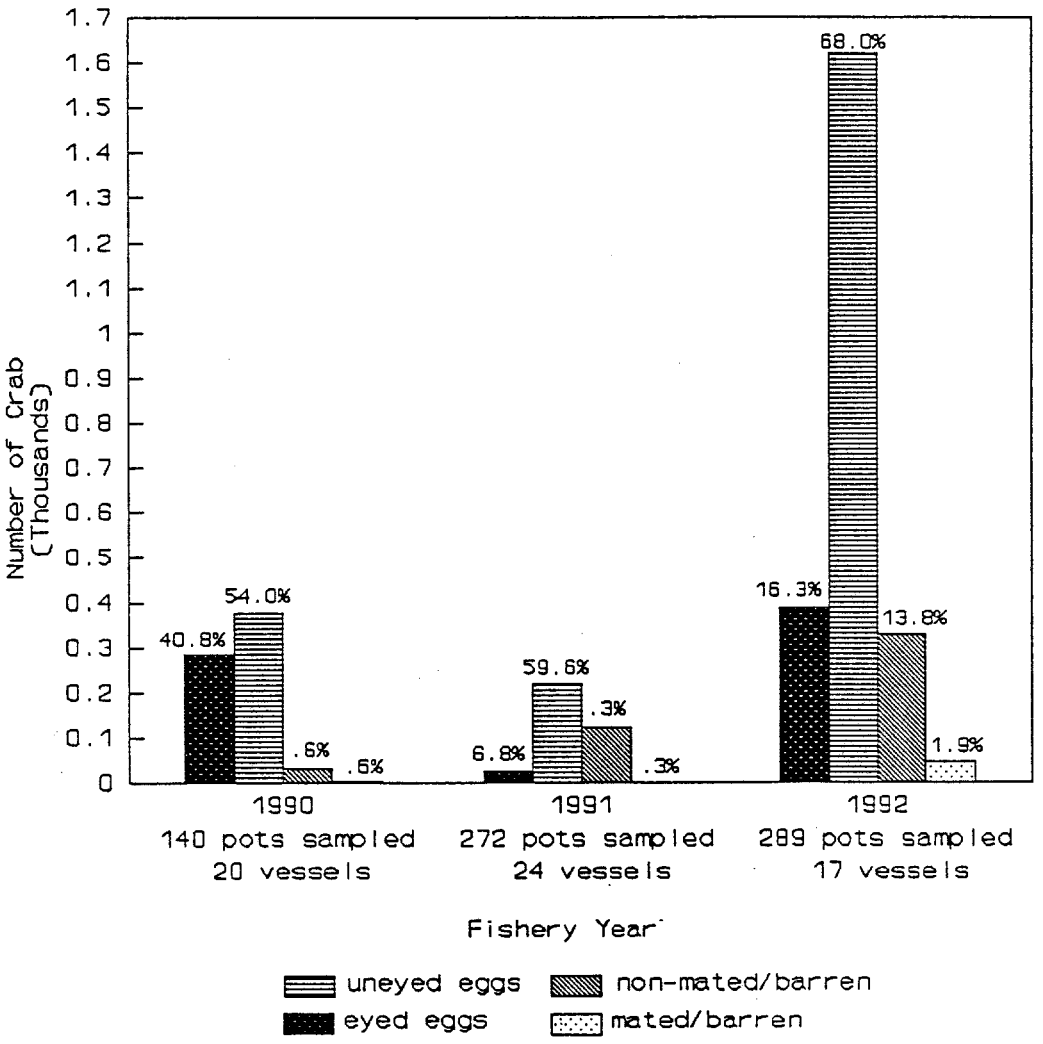


Figure 30 Reproductive states of female red king crabs observed in pot samples from the 1990, 1991, and 1992 Bristol Bay red king crab fisheries.

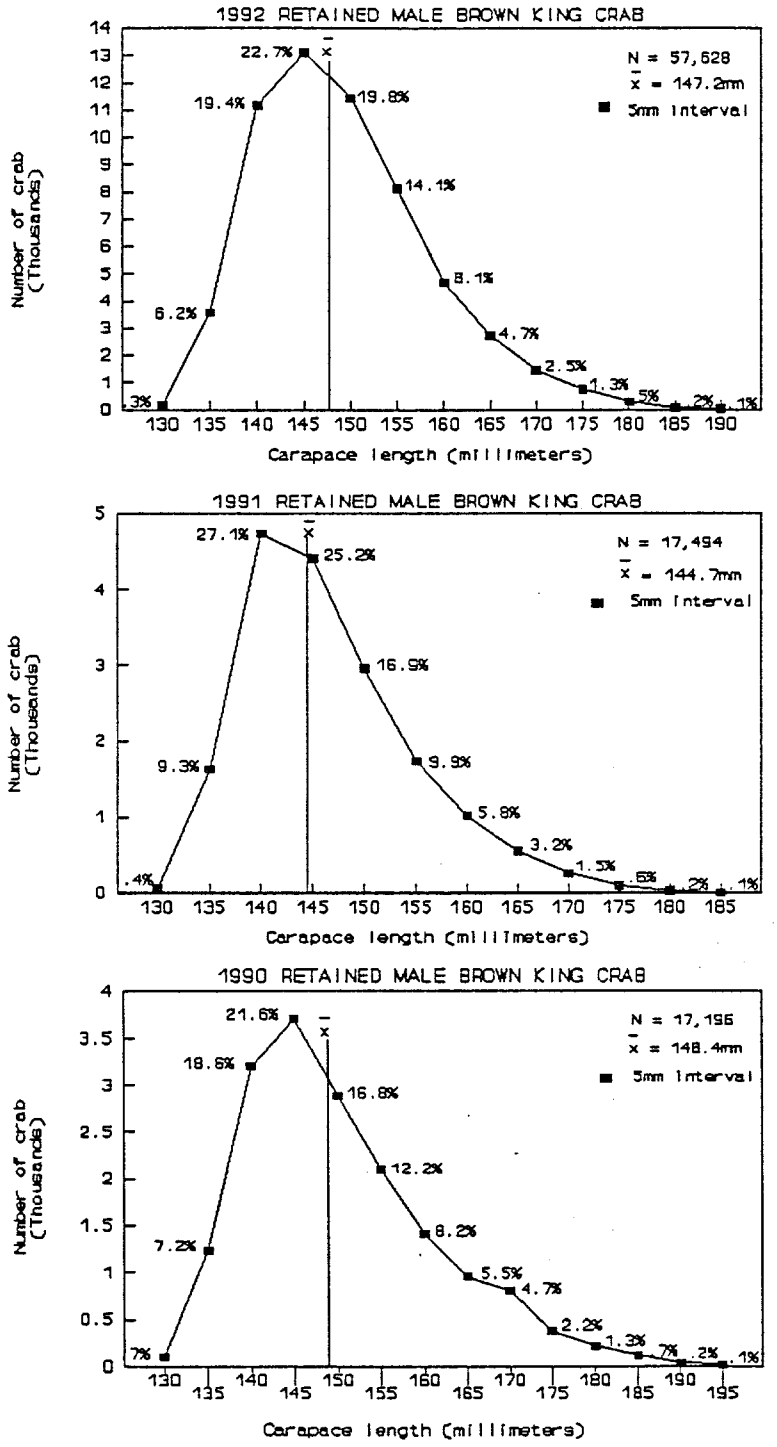


Figure 31 Commercially retained brown king crab length frequency statistics from the 1990, 1991, and 1992 Adak fisheries.

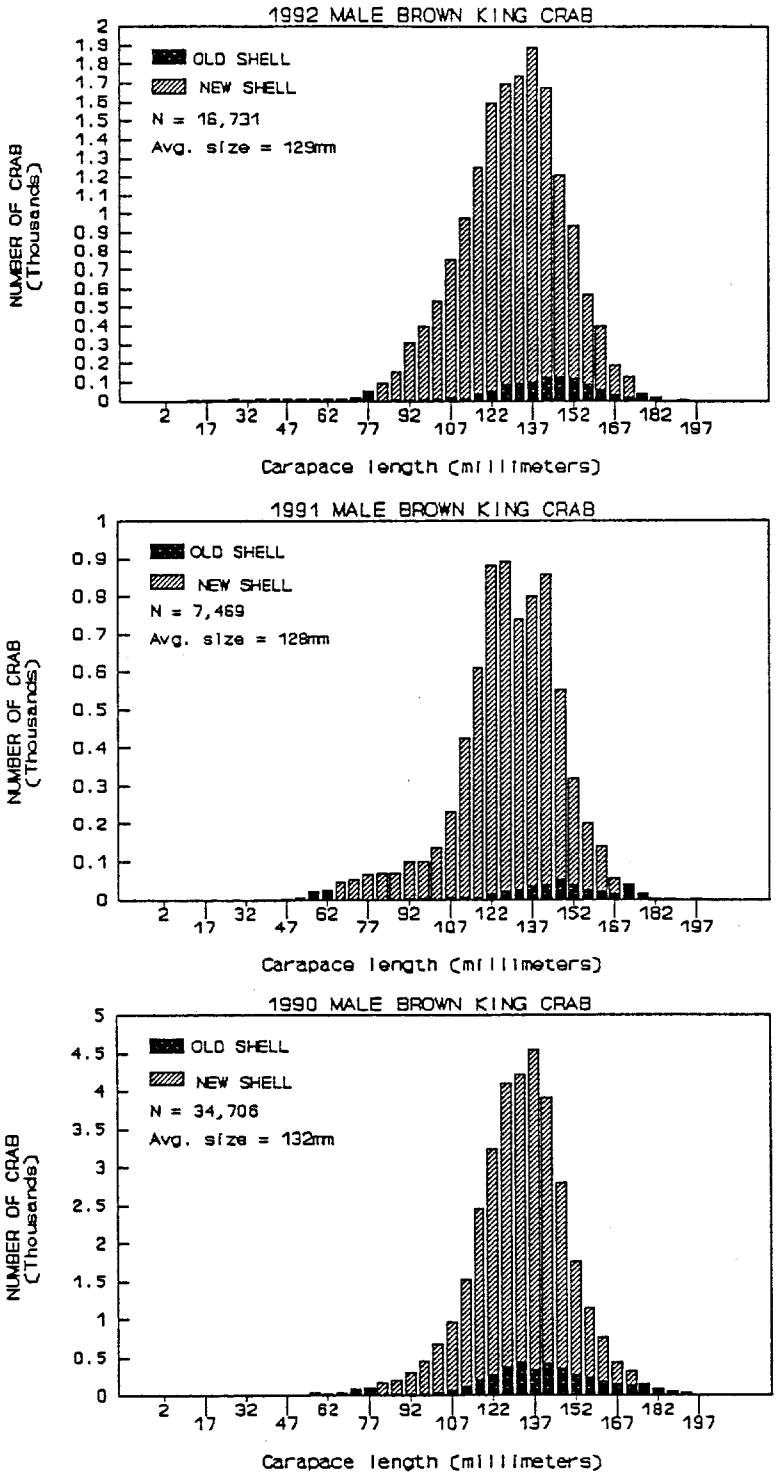


Figure 32 Length frequency distributions of all brown king crab males observed in pot samples from the 1990, 1991, and 1992 Adak area brown king crab fisheries.

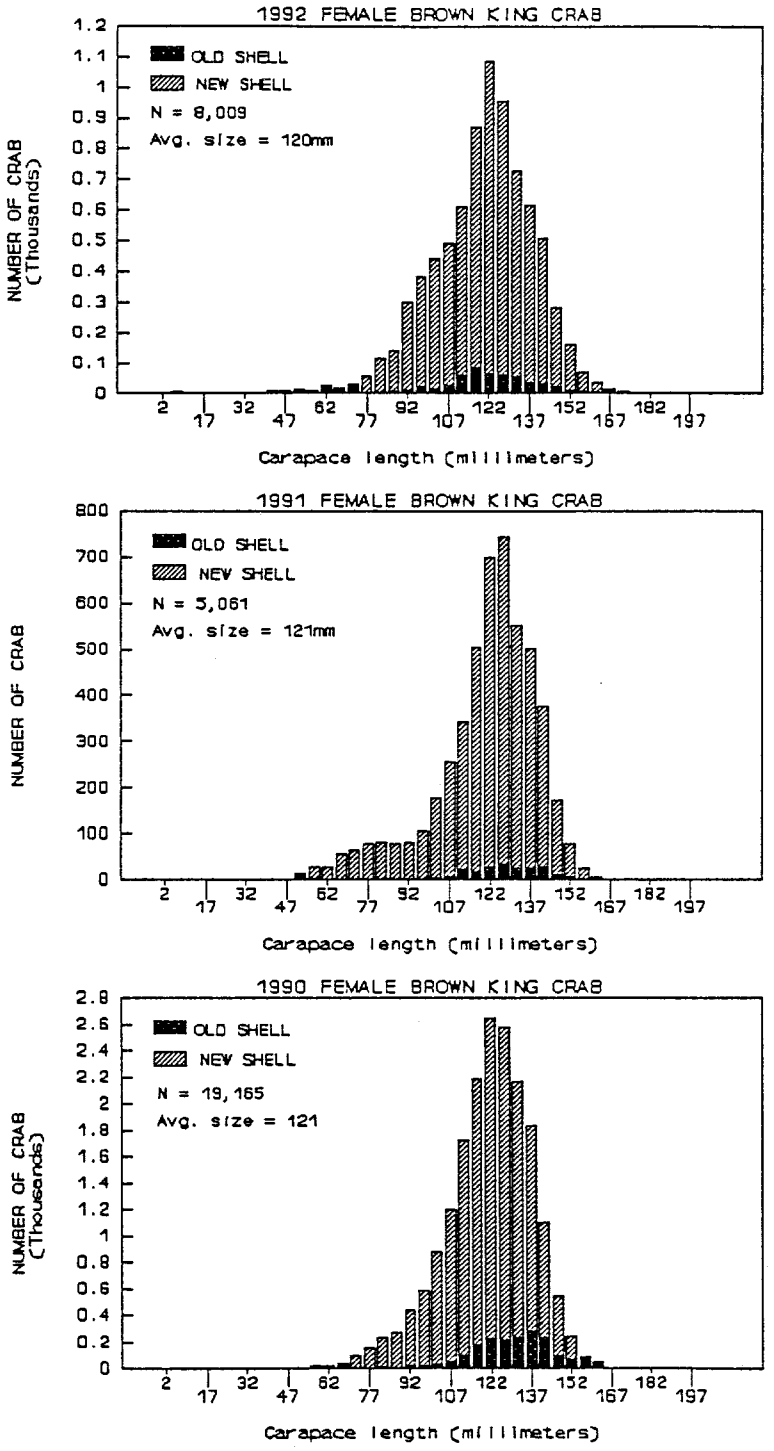


Figure 33 Length frequency distributions of all female brown king crabs observed in pot samples from the 1990, 1991, and 1992 Adak brown king crab fisheries.

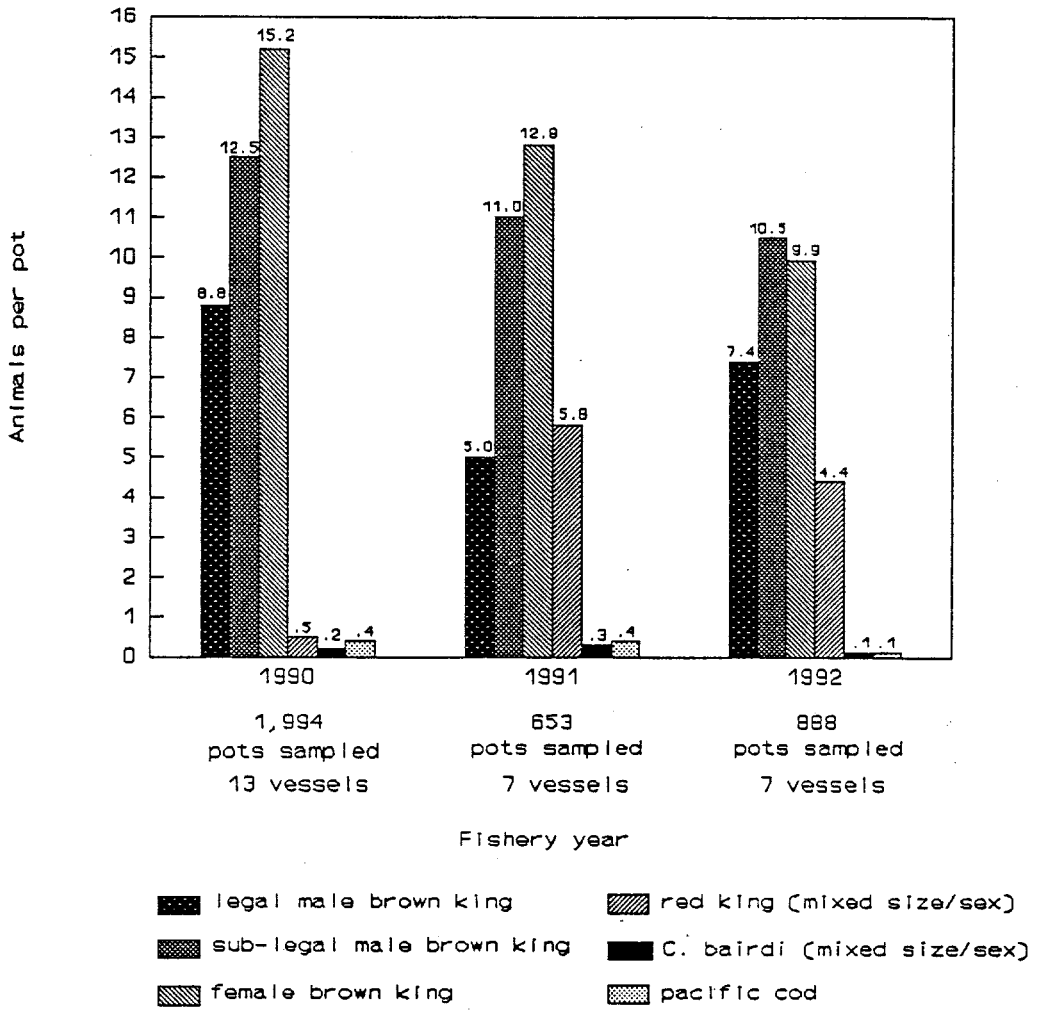


Figure 34 Catch per pot of commercially important species from the 1990, 1991, and 1992 Adak brown king crab fisheries.

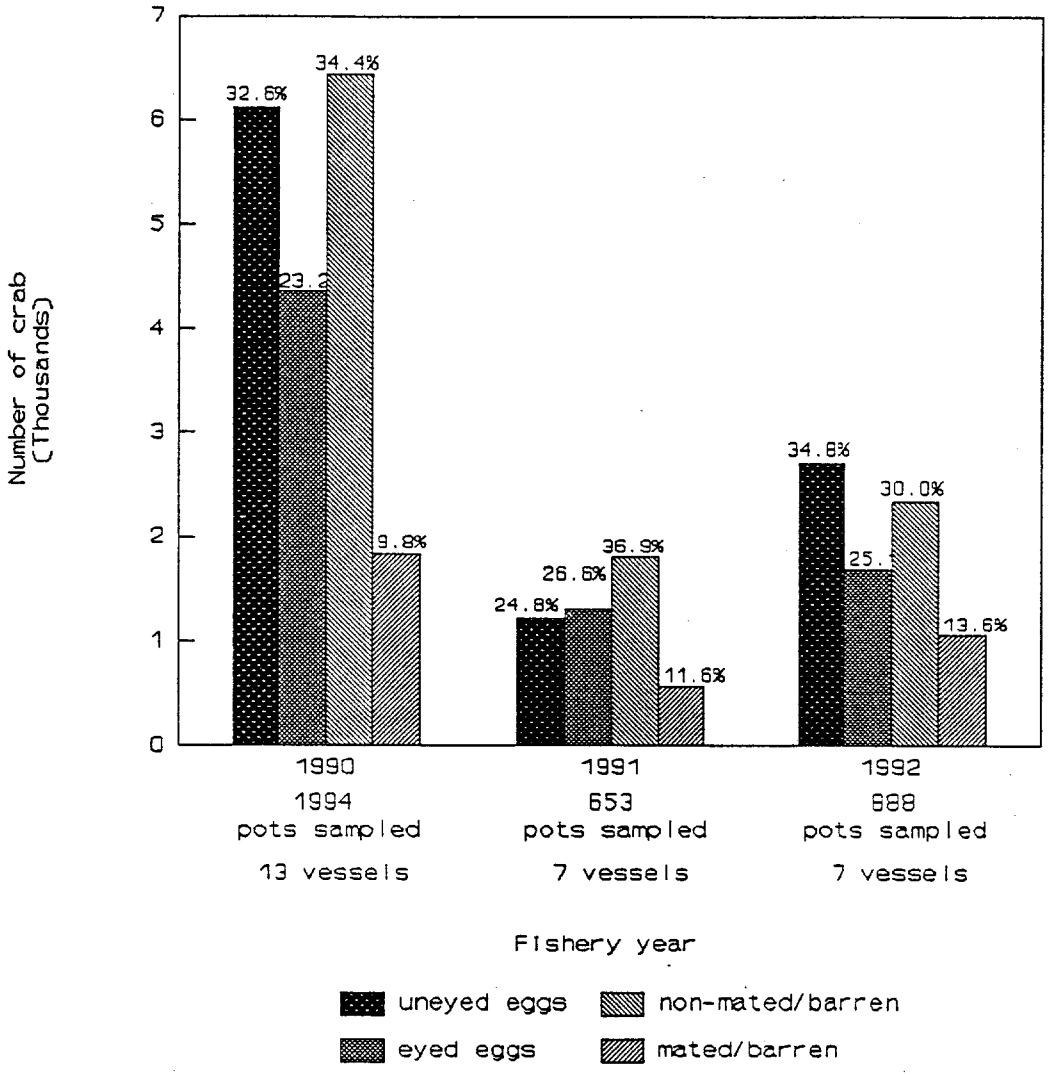


Figure 35 Reproductive states of female brown king crabs observed in pot samples from the 1990, 1991, and 1992 Adak brown king crab fisheries.

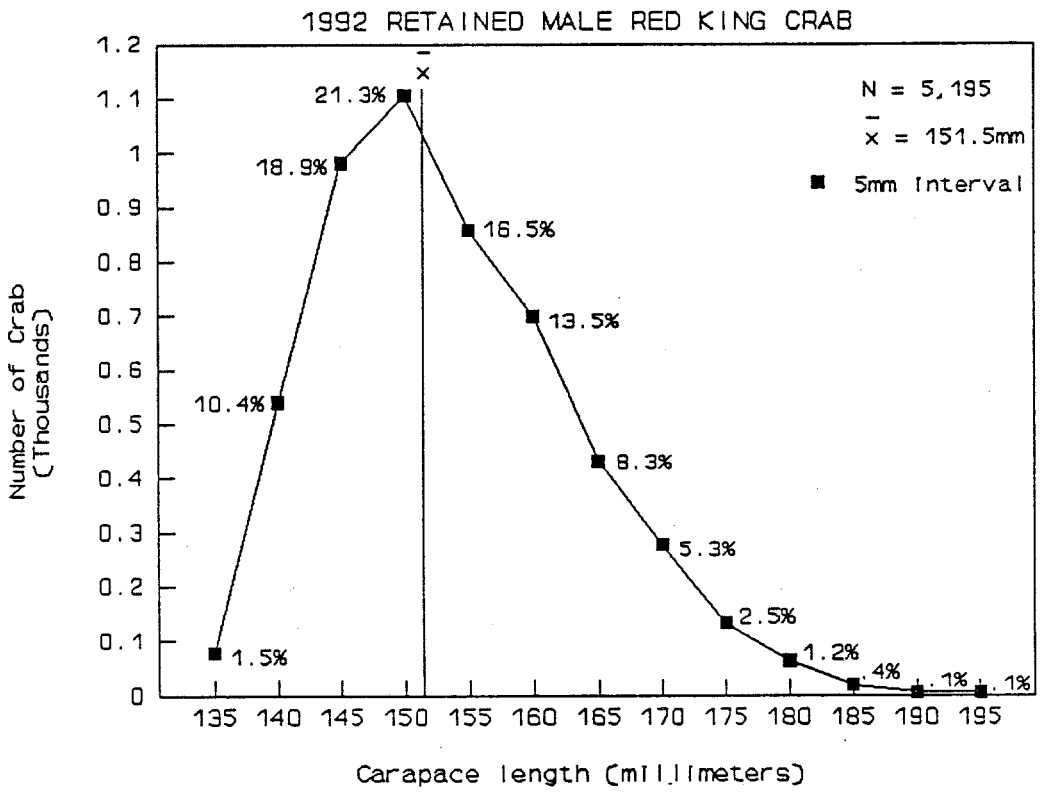


Figure 36 Commercially retained red king crab length frequency statistics from the 1992 Adak red king crab fishery.

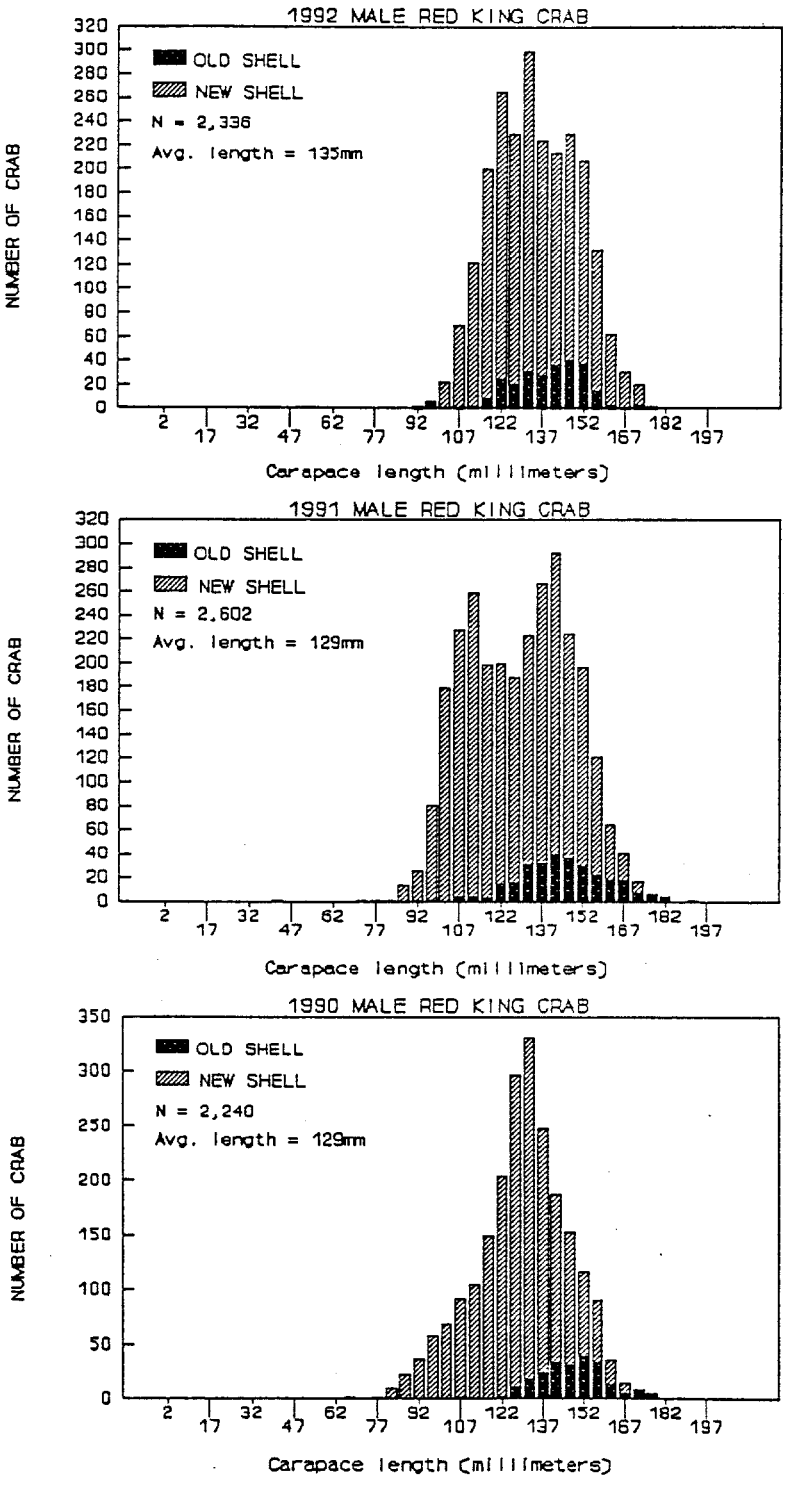


Figure 37 Length frequency distributions of all male red king crab observed in pot samples from the 1990, 1991, and 1992 Adak red king crab fisheries.

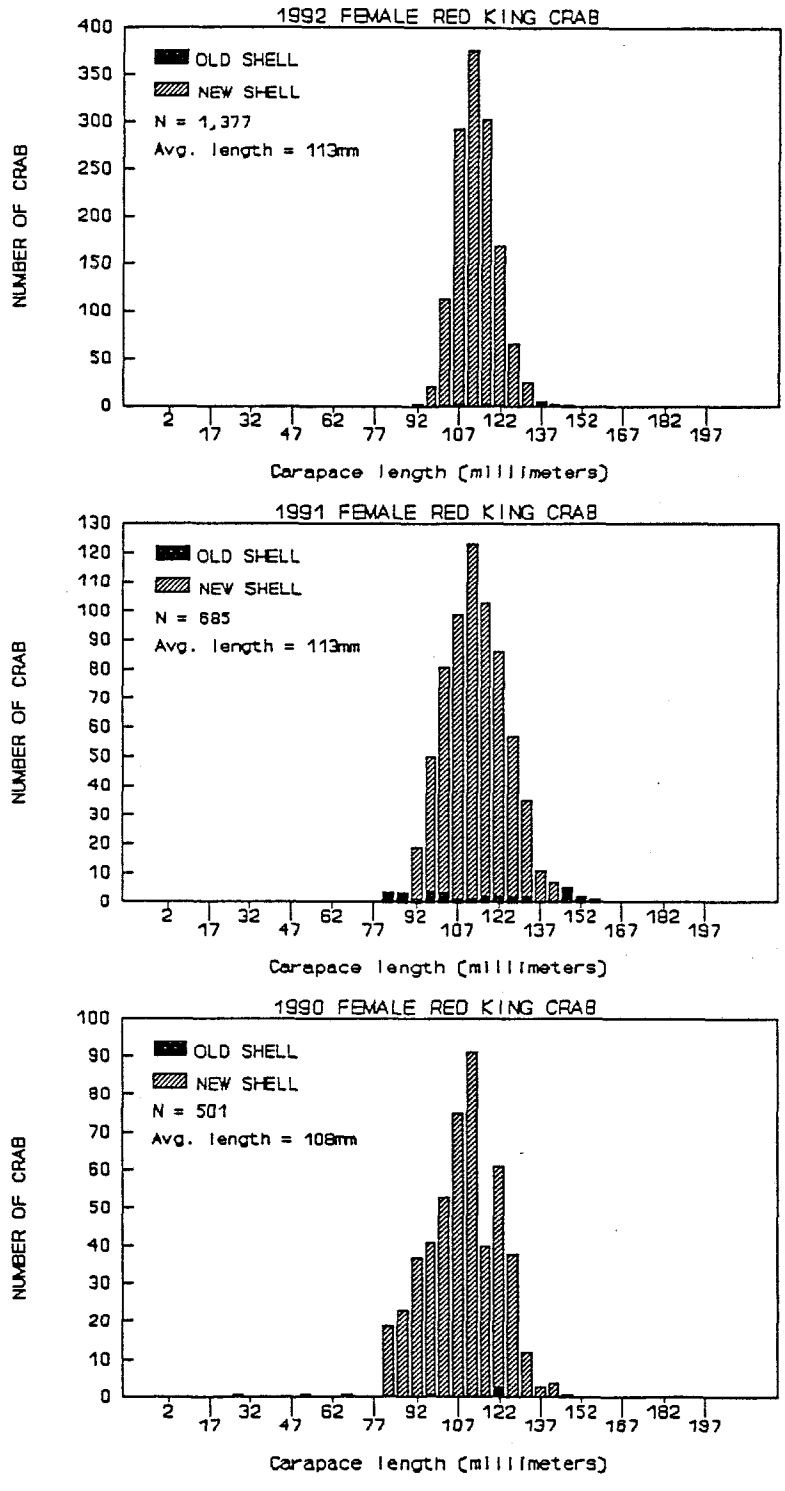


Figure 38 Length frequency distributions of female red king crabs observed in pot samples from the 1990, 1991, and 1992 Adak red king crab fisheries.

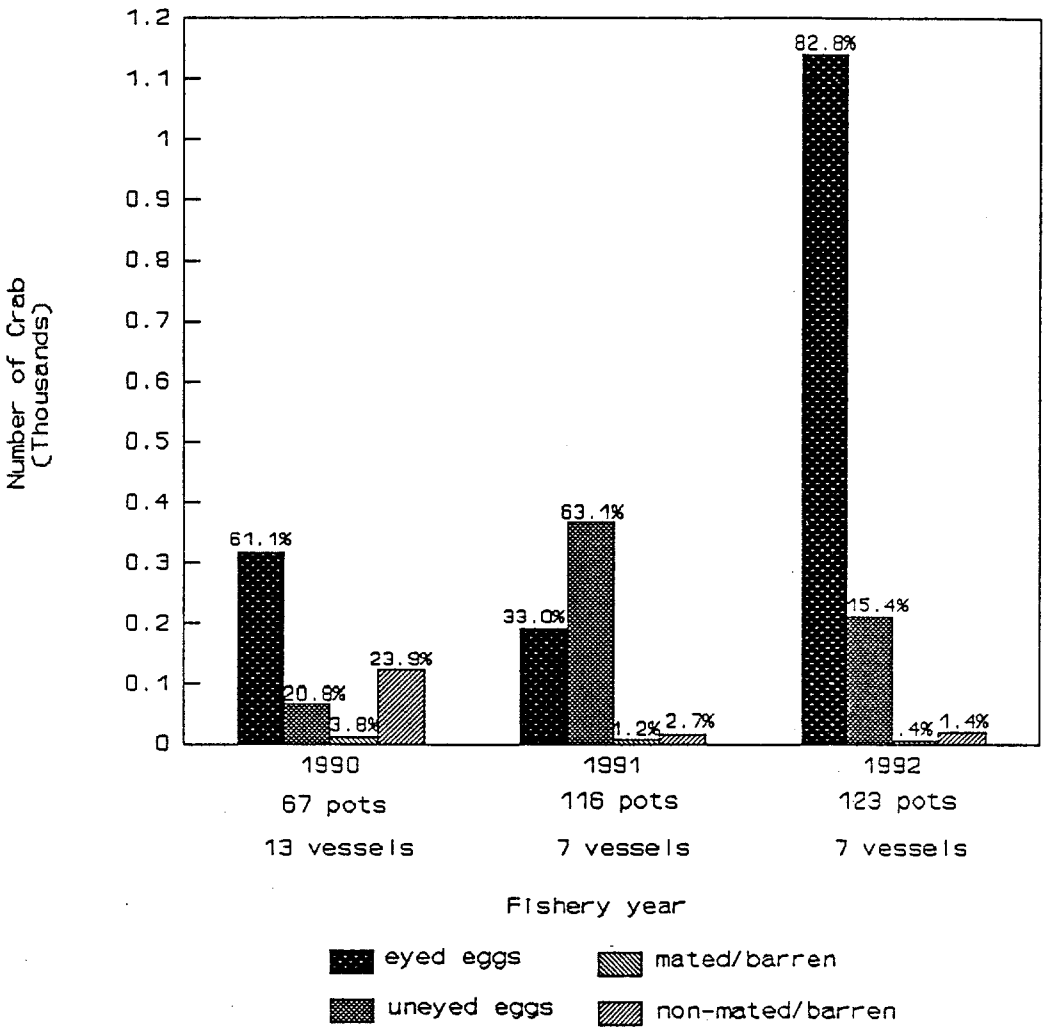


Figure 39 Reproductive state of female red king crabs observed in pot samples from the 1990, 1991, and 1992 Adak red king crab fisheries.

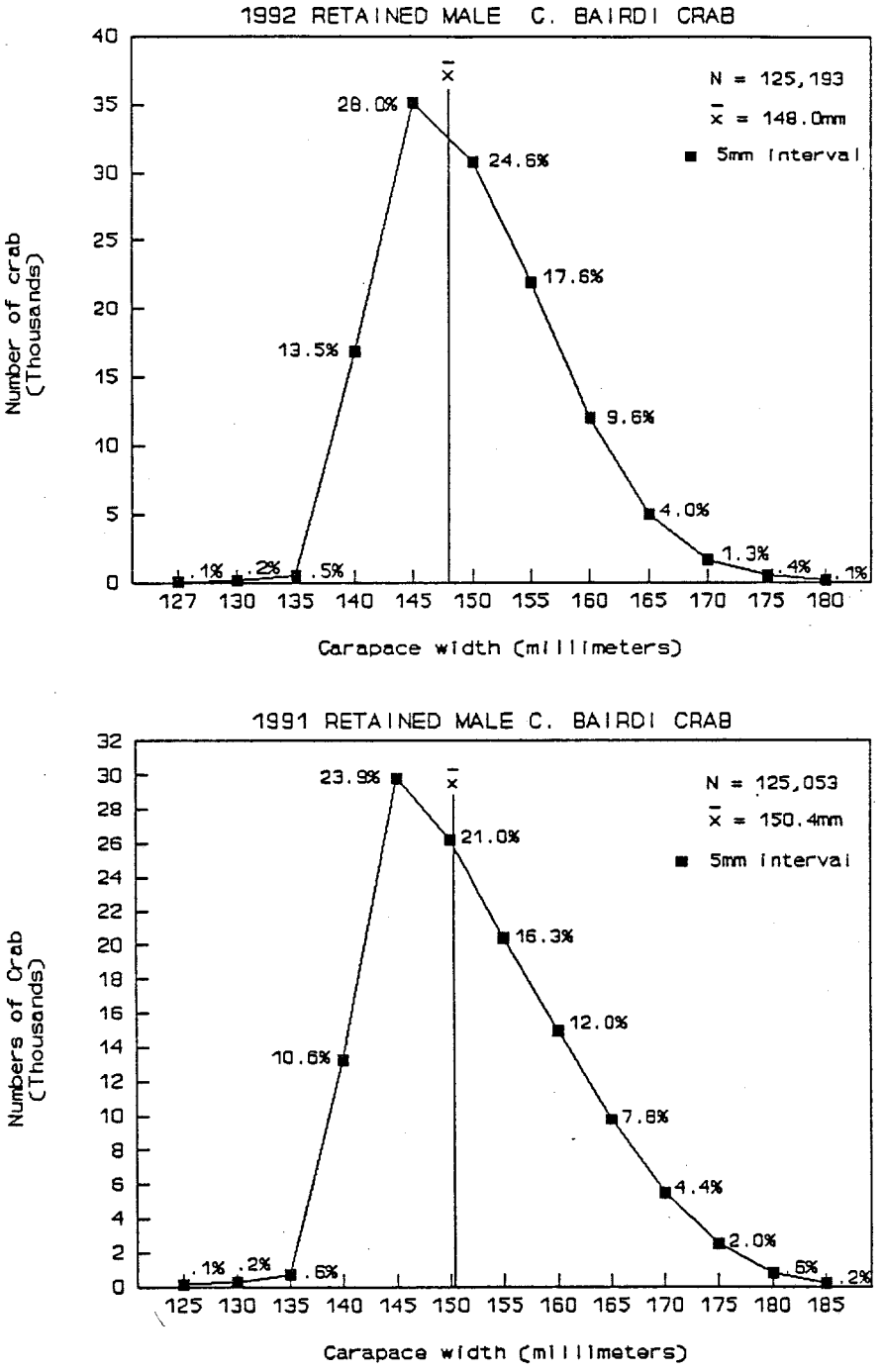


Figure 40 Commercially retained *C. bairdi* width frequency statistics from 1991 and 1992 Bering Sea fisheries.

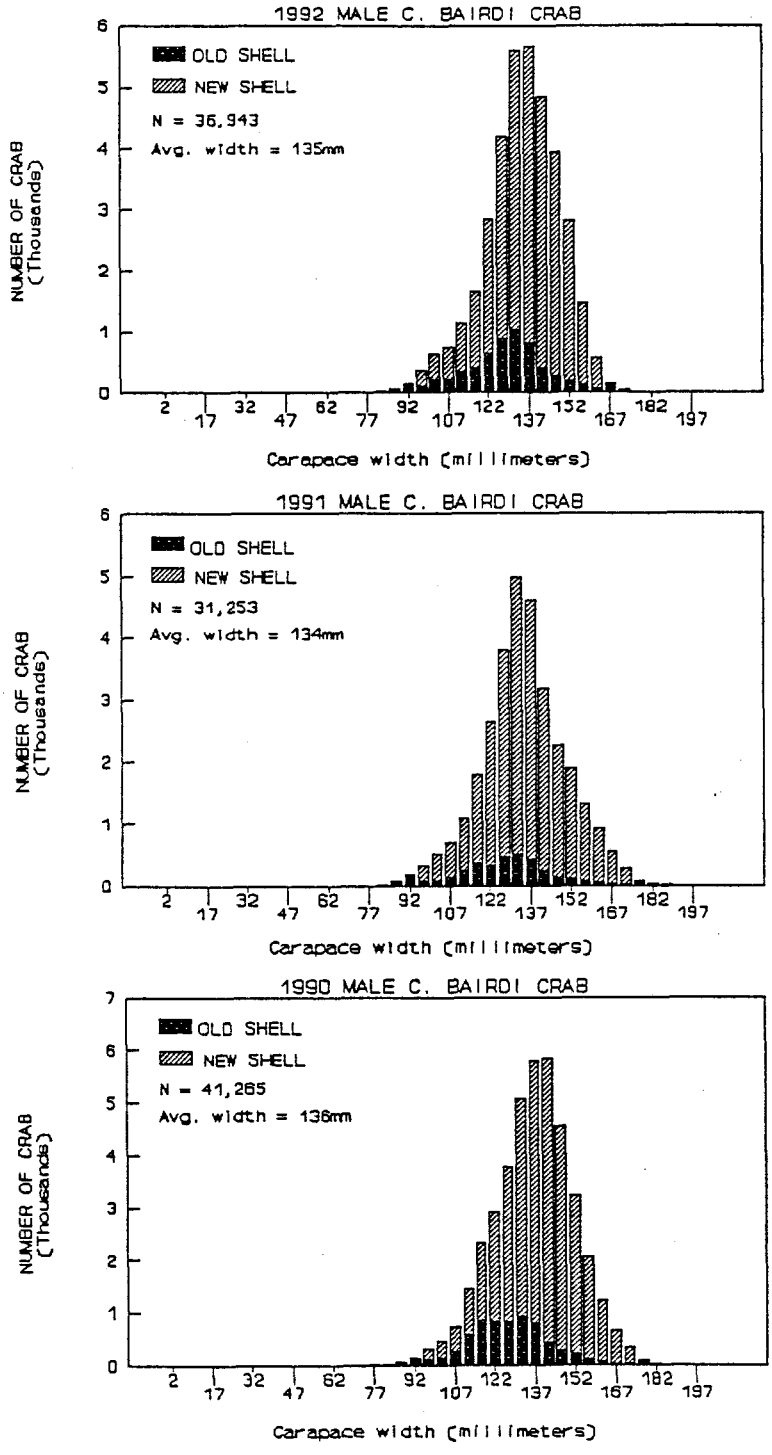


Figure 41 Width frequency distributions of all male *C. bairdi* observed in pot samples from the 1990, 1991, and 1992 Bering Sea *C. bairdi* fisheries.

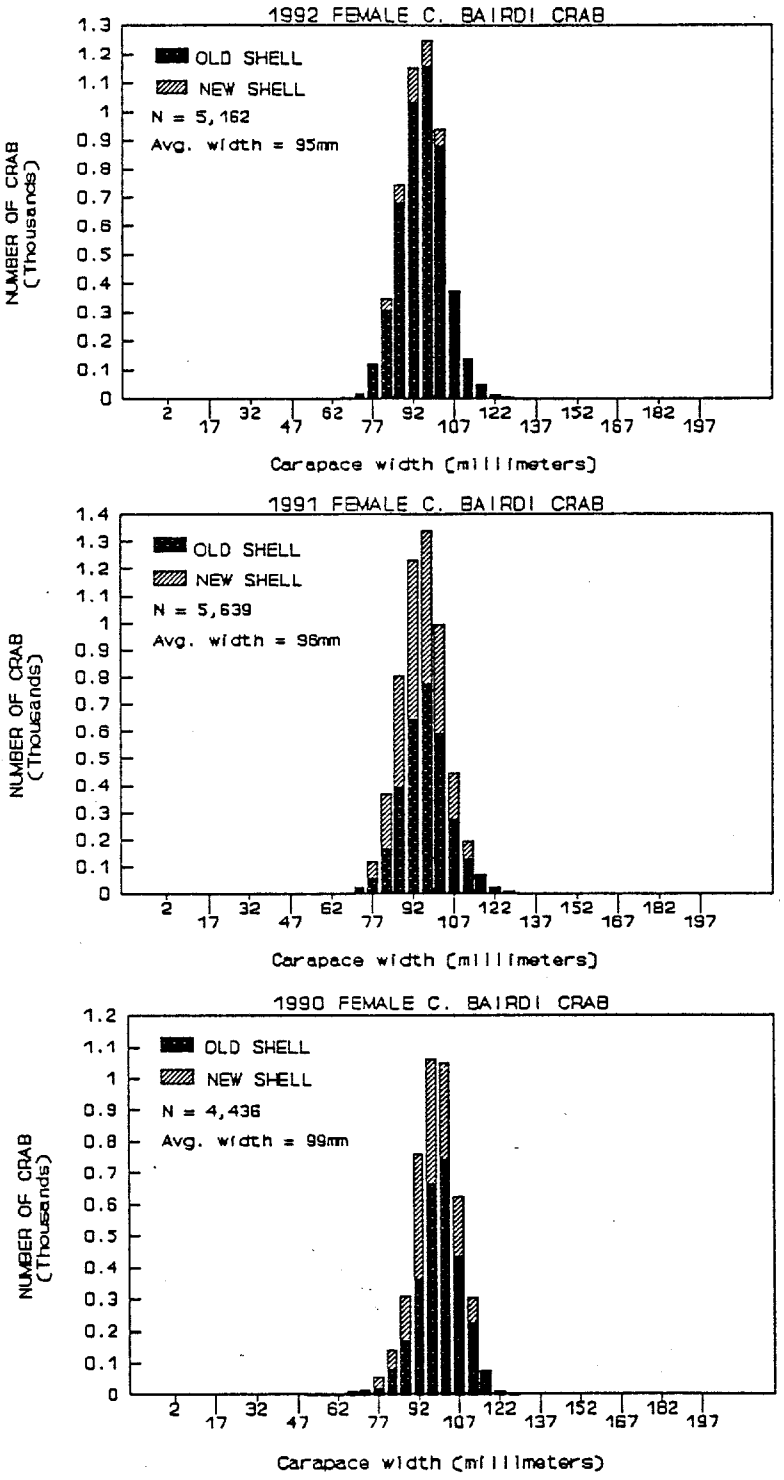


Figure 42 Width frequency distributions of female *C. bairdi* observed in pot samples from the 1990, 1991, and 1992 Bering Sea *C. bairdi* fisheries.

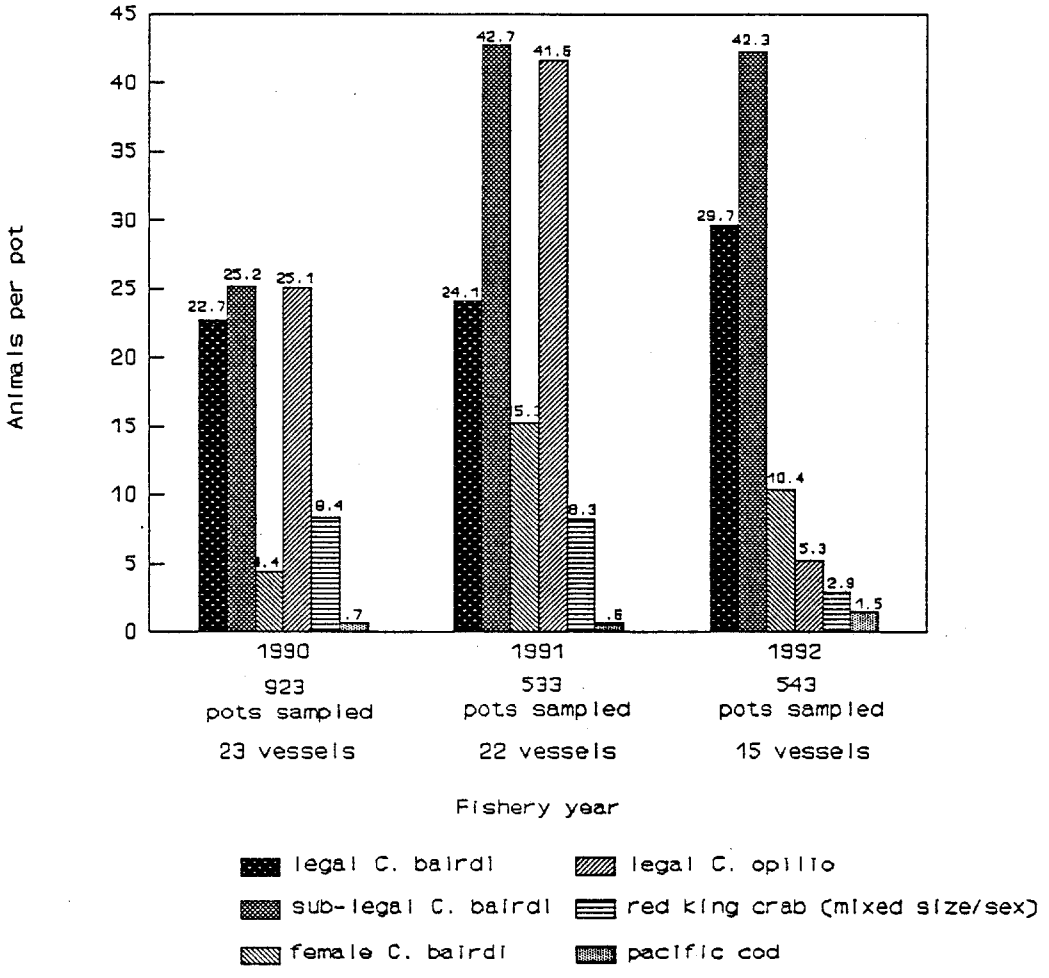


Figure 43 Catch per pot of commercially important species from the 1990, 1991, and 1992 Bering Sea *C. bairdi* fisheries.

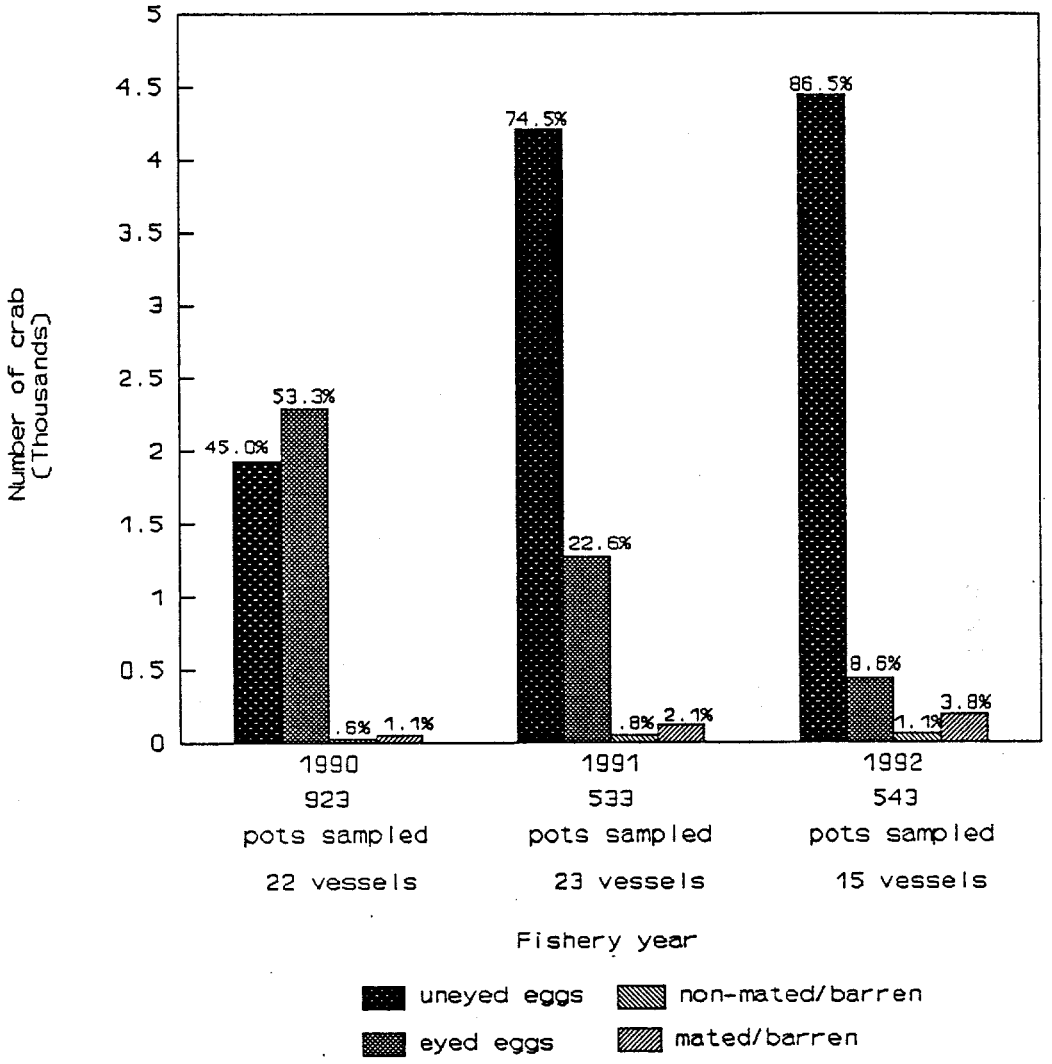


Figure 44 Reproductive state of female *C. bairdi* observed in pot samples from the 1990, 1991, and 1992 Bering Sea *C. bairdi* fisheries.